NOVEMBER, 1958

Commercial Fertilizer

and PLANT FOOD INDUSTRY

Demonstrating Fertilizer Results and Profits to Thousands of Farmers

SEE PAGE 20

Advertisement of NITROGEN DIVISION, ALLIED CHEMICAL

Appearance may be improved through better design, sharper color printing, reproportioning, or better choice of outside wall.

A frank discussion with us may result in a more attractive bag, reduced production costs and increased sales of your product.

When will you talk with our representative?

The Newest **KRAFTPACKER**

will handle any free-flowing material f-a-s-t-e-r, with more accuracy, than any bag filling machine of its type!

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary
230 Fifth Avenue, New York 20, N. Y.
Daily News Bldg., Chicago 6, Ill.
Integrated mills at St. Marys, Georgia and Gilman, Vermont

gilman PAPER CO.
• St. Marys Kraft Corp.
• Gaylord Container Div.
• The Coldwood Corp.
• Kraft Bag Corp.

☐ We are interested in improving our bag.
☐ We are interested in your Kraftpacker.

CF

NAME OF COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____ PRINCIPAL_____

PRODUCT MFD._____

Smirow
the natural organic favorite

SMIROW is the favorite natural organic of fertilizer manufacturers and farmers-and has been since 1921.

ONE HUNDRED PER CENT natural organic, uniform in texture and color, excellent mechanical condition, dust free – that is SMIROW tankage. There is no substitute for SMIROW's combination of benefits for fertilizer manufacturers and farmers.

Used in mixed fertilizers or applied direct, SMIROW provides sustained, even-feeding for that all-season effect on plant growth. SMIROW is not a synthetic — but 100 percent natural organic.

Put more customer benefits in your fertilizer
—add to its selling power—with SMIROW tankage, the 100 percent natural organic nitrogen.
Let us figure the cost of SMIROW delivered to your plant.

SMITH SMIROW ROWLAND

SMITH-ROWLAND CO.
P. O. BOX 1219, NORFOLK 1, VA.

SMITH-DOUGLASS SD

A DIVISION OF SMITH-DOUGLASS, INCORPORATED

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Commenting Freely

by BRUCE MORAN

Now is the time to do all the things your plant needs to bring it up to date. People around you may still be biting their nails and shivering over the bogy of depression. But the better informed are worrying about an even worse bogy—inflation. And that's the thing to look at when the men down in the plant ask for new equipment.

Right now the things your plant needs are cheaper than they are likely ever to be again. The equipment people are not rushed with business, can do the job well and fast . . . and have sharp pencils.

In our business, unlike many, we can pile up a reserve and shut down for modernization without any loss of business due to the down time. And in our business we can profit from mechanization, because a "push-button" plant enjoys a better net.

A lot of our plants are modernizing, but too many more are struggling along with the old techniques, only a step or two better than the mule and shovel days. It is something not only to think about—but to do something about, and soon. Plan now so when the season ends you can start actual work on your plant.

NOW

PHOSPHORIC ACID

From The Country's Largest And Most Dependable Source Of Phosphate Products For High Analysis Formulations

TRIPLE SUPERPHOSPHATE—RUN-OF-PILE • GRANULAR • COARSE

Phosphoric Acid of highest purity
to assist you in reducing
formulation cost and maintaining
consistent, uniform high quality
in all your phosphate processing.

Manufactured to the following specifications:

52-54% P_2O_5
Solids less than 1% by weight
Specific Gravity: (60°F) 1.68-1.73

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Division
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Precision Reproduction

A complete, experienced "Background" in quality controlled printing guarantees clean, accurate reproduction of trade-marks and company identification for every Raymond Multiwall customer. Creative developments such as Raymond Background Printing give added sales impact. Check the important advantages of Raymond "Background" printing with your Raymond Representative. He'll be glad to show you how they can work for you.

Special Problem? New multiwall developments may be the answer. Write Raymond Bag Corporation, Research & Development Division, Middletown, Ohio.

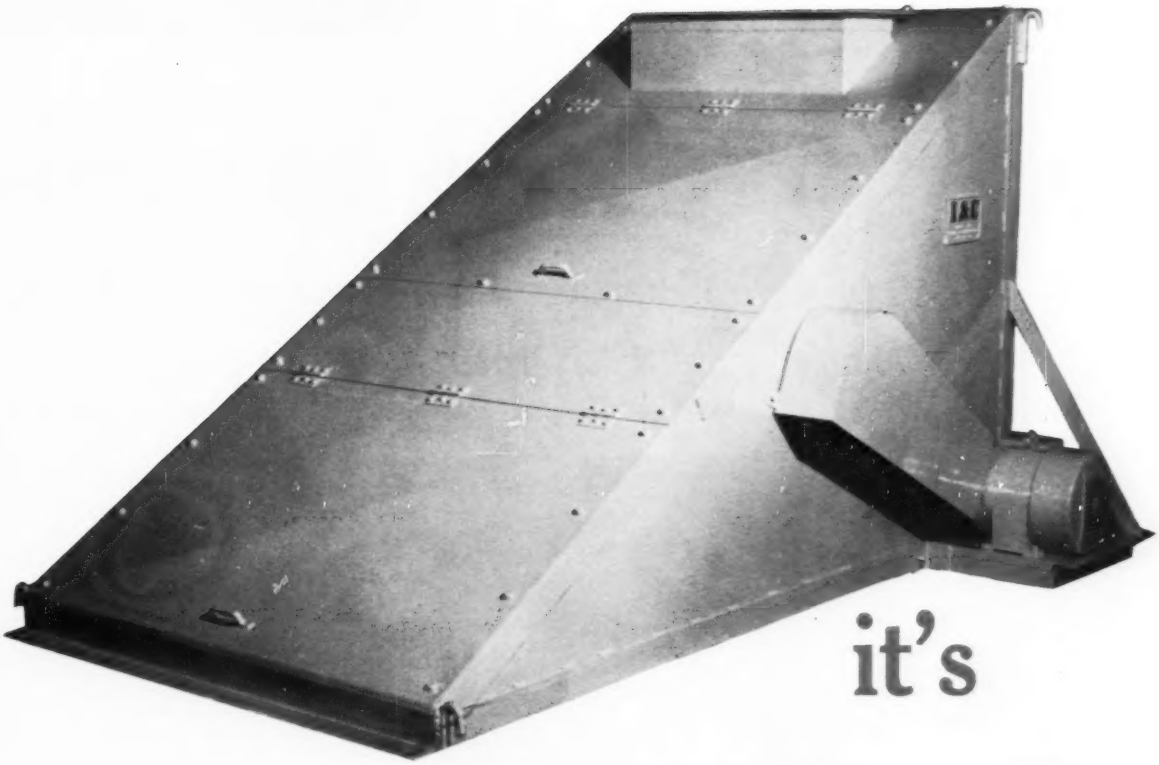
Raymond
BAG CORPORATION
A division of Albemarle Paper Mfg. Co.
MIDDLETOWN, OHIO • RICHMOND, VA.

FROM

Receiving
raw materials

TO

Shipping
finished product



it's

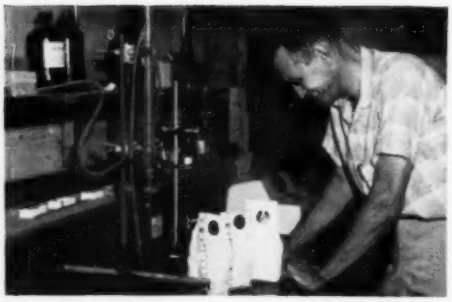
I & C

ANOTHER NEW PRODUCT bearing the well known I & C name is the new OSCILLATING SCREEN pictured above. Simple in design and built to last, it provides efficient screening, fast operation and easy maintenance. One more way in which I & C CAN SAVE YOU MONEY. For details write or call

INGLETT & COMPANY, INC.

P. O. Box 3425 REgent 6-9795 Augusta, Ga.

STRAIGHT FACTS FROM THE FIELD . . .



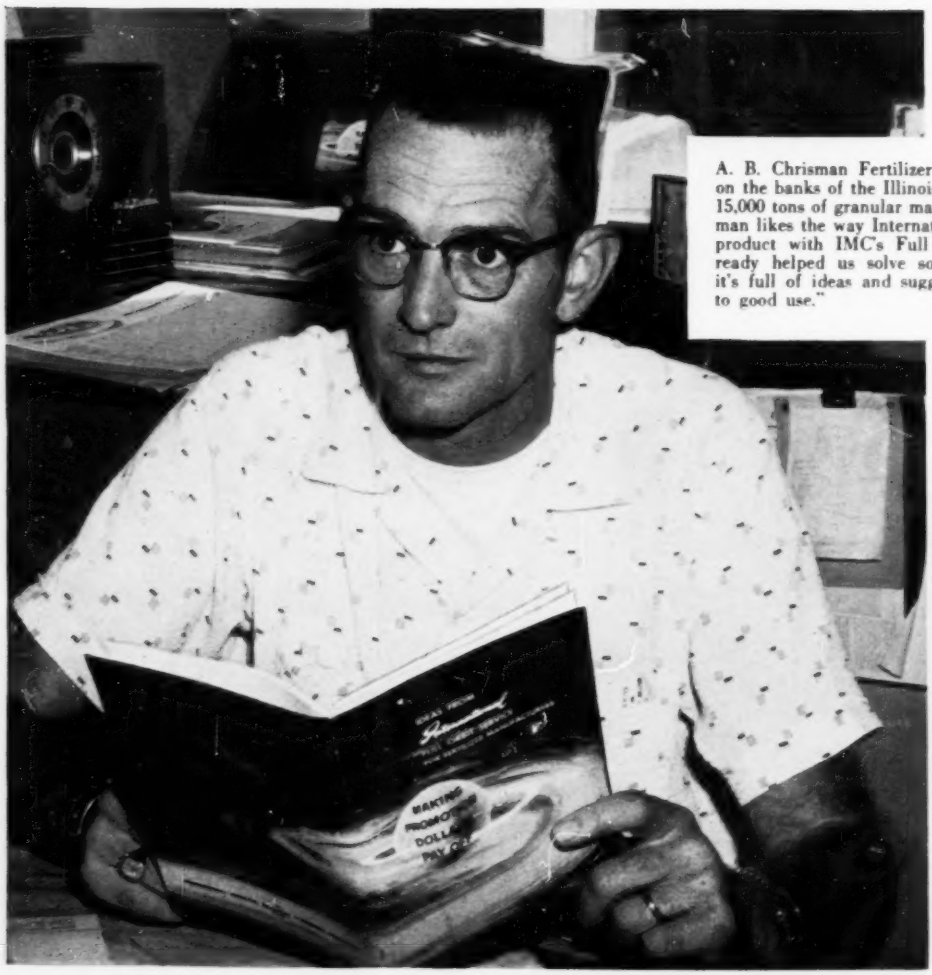
State-approved soil testing laboratory helps Chrisman improve service to his customers. Last year 10,000 sample tests were analyzed. Tester is Wilbur Kunzeman. Firm also employs a full-time agronomist.

"International's triple super service

tailors delivery and service to my plant schedules,"

says A. B. Chrisman,

President, A. B. Chrisman Fertilizer Company, Meredosia, Illinois



A. B. Chrisman Fertilizer Company, located almost on the banks of the Illinois River, produces 12,000 to 15,000 tons of granular material annually. Mr. Chrisman likes the way International Minerals backs their product with IMC's Full Orbit Program. "It's already helped us solve some business problems — it's full of ideas and suggestions that we're putting to good use."

Joe Smith, Plant Superintendent, checks on carefully regulated flow of materials going into mixer, assuring a guaranteed dependable analysis of grade for the Meredosia area.

Out goes a sack of 0-46-0 on the back of Roland Ransom. Most popular ABC brand fertilizers are 12-12-12 and 16-8-8. Chrisman uses IMC coarse run-of-pile . . . markets up to 12 different grades of fertilizer.

A. B. Chrisman has been buying IMC Triple Superphosphate for the past 2½ years. Asked why he uses International's Triple, he replied, "I started on International Triple Super because they were the first to ship by barge up the Illinois River to this area. I'd had promises of material being barged in by other firms but they didn't deliver. International promised *and delivered!*

"The folks at IMC make it a business to know my problems, so they can give me the service I need when I need it. They work right along with me and help me anticipate my needs during the busy season when the rush is on.

"Shipment is always just what I order too," adds Chrisman. "I use International Minerals' coarse run-of-pile. It's top-notch quality material . . . has just the characteristics we need to help us manufacture our granular mixed goods."

You can benefit from International's triple super service. Write, wire or call for details.

Growing business necessitated expanded facilities. Chrisman and building contractor, Russell Collison, discuss new building that will add storage for 1500 tons of material.

Creators of Living Minerals

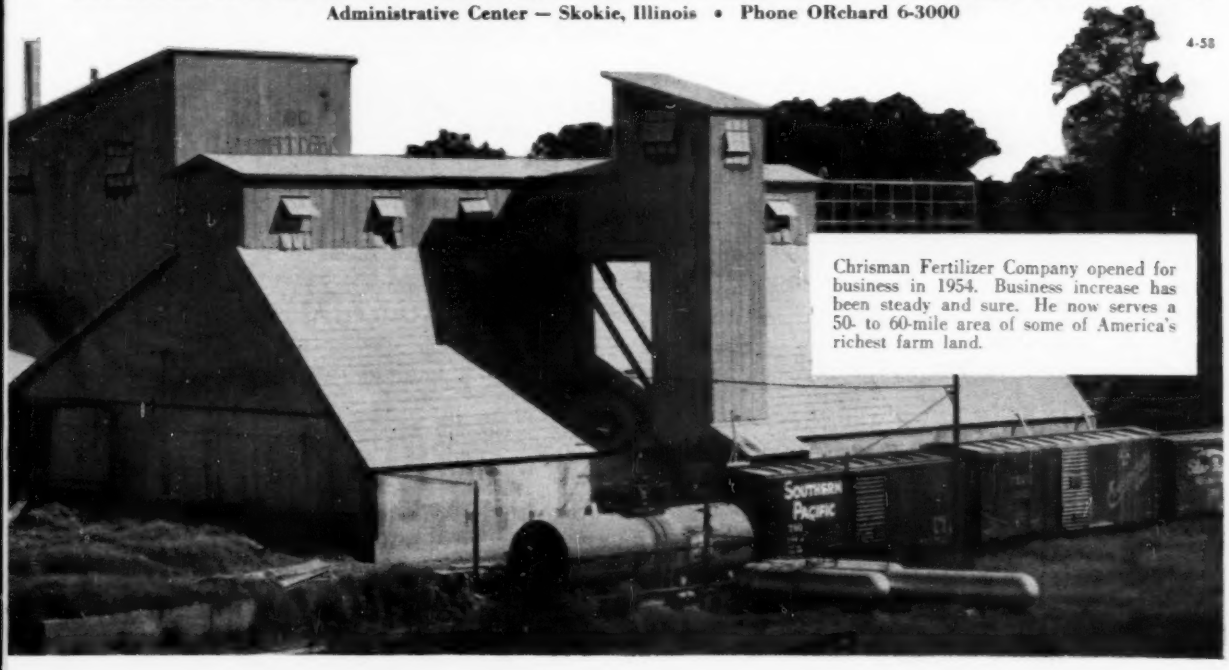
MINERALS International CHEMICALS

PHOSPHATE CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center — Skokie, Illinois • Phone ORchard 6-3000

4-58



Chrisman Fertilizer Company opened for business in 1954. Business increase has been steady and sure. He now serves a 50- to 60-mile area of some of America's richest farm land.

DUVAL

Drilling blast holes with a multiple mounted drill in the Duval mines near Carlsbad, New Mexico. One of the many processes which bring you . . .

High Grade Muriate of Potash...

HIGH ANALYSIS • DEPENDABLE SUPPLY • UNSURPASSED SERVICE

DUVAL SULPHUR and POTASH CO.

Exclusive Distributors

ASHCRAFT-WILKINSON CO.

ATLANTA, GEORGIA

Cable address: Ashcraft

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3 REASONS WHY YOUR CHOICE SHOULD BE

TREBO-PHOS*

Cyanamid's quality triple superphosphate

1 **GRANULATION**

Trebo-Phos in typical commercial runs is producing high analysis mixed fertilizers with excellent granulation.

2 **AMMONIATION**

Ammoniation easily achieved up to 4.6% and higher with suitable equipment *without* uncomfortable ammonia fumes. Physical condition of Trebo-Phos makes possible maximum and uniform absorption of ammonia.

3 **CYANAMID SERVICE**

Cyanamid's new, ultra-modern triple plant has high storage capacity for Trebo-Phos. Inventories are maintained at levels that let Cyanamid fill your orders promptly. Cyanamid traffic experts are at your service to assure the most prompt, economical deliveries. Cyanamid technical representatives are available to help you solve production problems *in your plant*.

CYANAMID

WRITE, WIRE OR PHONE FOR FULL INFORMATION. OUR REPRESENTATIVES WILL BE GLAD TO CALL. NO OBLIGATION ON YOUR PART.

*TRADE MARK

American Cyanamid Company,
Agricultural Division,
Phosphates Department,
30 Rockefeller Plaza, New York 20, N. Y.

WEST VIRGINIA PULP AND PAPER

230 PARK AVENUE, NEW YORK 17, N. Y. • PLANTS: TORRANCE, CALIFORNIA

THE Toughness Champ WINS ON POINTS

OUR CLUPAK* MULTIWALL

Proven best for shipping fertilizer

The Kraftsman Clupak paper in our new multiwalls has a patented, built-in "stretch" that gives them much greater toughness. That's why they're far better than ordinary bags for shipping fertilizer. For instance:

In drop tests by a Kansas fertilizer packager, Clupak multiwalls outlasted ordinary bags by three times as many drops, and now he's profiting with "Toughness Champ" bags.

An Ohio fertilizer formulator compared the breakage of 80# three-ply Clupak multiwalls (total basis weight 160#) against 80# three-ply regular bags (total basis weight 180#). The Clupak bags proved 400% better in his test.

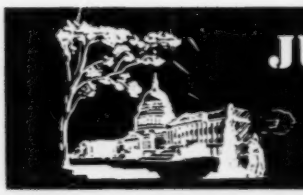
A Missouri user reports Clupak multiwalls are the best he has ever used for fertilizer. No breakage in trucks shipped to date.

Choose your own toughness standard. Clupak multiwalls will win on points over ordinary bags every time. They cost the same so why not prove it to yourself. Let us include a trial shipment of 5,000 Clupak Multiwalls in your next order. Call or write:

W V COMPANY • MULTIWALL BAG DIVISION

ST. LOUIS, MISSOURI • NEW ORLEANS, LOUISIANA • WELLSBURG, WEST VIRGINIA

**Clupak, Inc.'s trademark for extensible paper manufactured under its authority*



JUST AROUND THE CORNER

By Vernon Mount

ONLY PEOPLE can stop inflation, just as only people can stop crime. And there is really little separation between the criminal aspects of each. For inflation hurts those who can least stand it - widows and orphans, older people on fixed insurance benefits, etc.

A MORAL ISSUE has been raised on this subject, calling inflation a disguised form of theft, and a narcotic which produces the illusion of prosperity and hides the real damage. And the man who raises the issue is no less a person than Senator Bennett of Utah, a member of the Senate Finance Committee.

MANAGEMENT can help labor spread the word about the real menace which lies ahead as costs roll up, purchasing power grows,--and demand pushes prices even beyond the point of normal return. We should all contribute to the fight, remembering what happened abroad when inflation engulfed them.

Yours faithfully,

Vernon Mount

SEND FOR YOUR BOOKLET

"The Installation and Operation of a Nitrogen Solution System" to P. O. Box 4628, Atlanta 2, Ga.

KNOW you are RIGHT and get

A COMPLETE PACKAGE

NO PROBLEMS by ordering from one source

NO WORRIES Our System has no flaws

Nitrogen Solution System

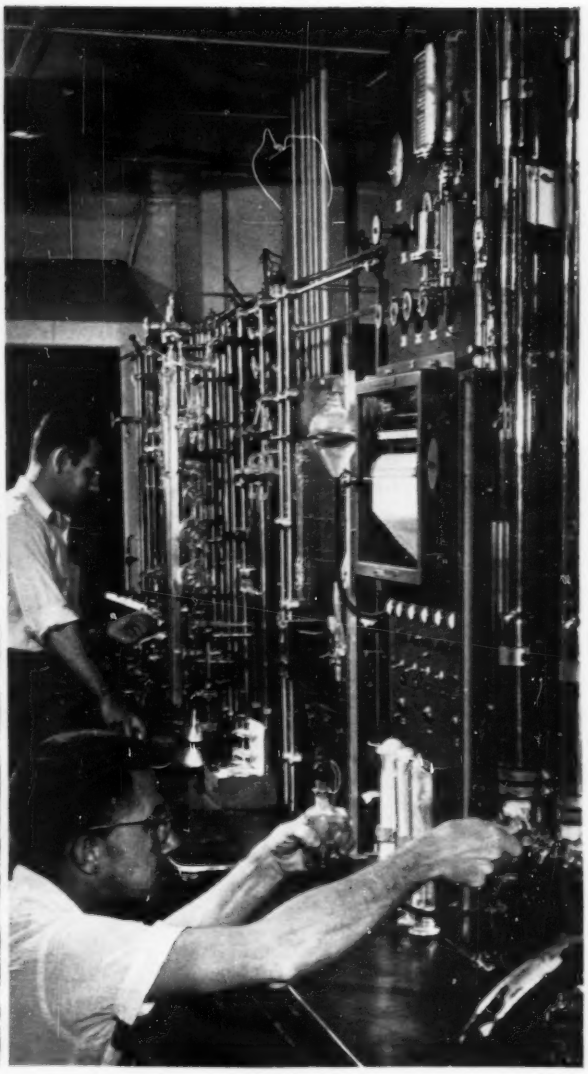
We have been handling Nitrogen Solution problems for 20 years. Don't depend on a source who knows nothing of your problems. We can give you tested and guaranteed valves, pipe, fittings and all the miscellaneous items you need on one order. Call, Write or Wire J. A. (Joe) Naylor and know you are right.

J. M. TULL METAL & SUPPLY COMPANY, INC.

285 Marietta St., N. W. JAckson 5-3871 ATLANTA 2, GA.

Branch Warehouses

BIRMINGHAM JACKSONVILLE MIAMI TAMPA



IN FERTILIZER FORMULATION:

WHETHER YOUR PROBLEM IS A PRODUCT OR A PROCESS TEXACO RESEARCH CAN HELP YOU SOLVE IT

If you need a better way to make your present product —or to develop a brand new product for a new market, Texaco's technical service can help you solve the problem faster.

Your formulation problem may be one of those that Texaco has already solved. If not, Texaco has the facilities and the know-how to come up with a prompt solution.

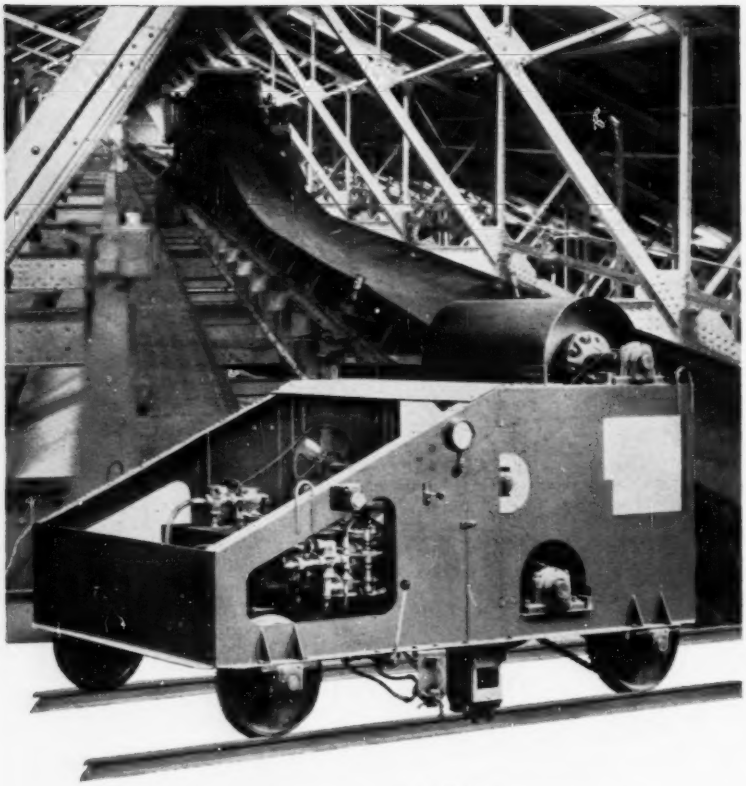
Texaco can help you use and handle ammonia and nitrogen solutions more effectively and more profitably —and you can depend on it that the ammonia available from Texaco's new facility at Lockport, Ill., is always in abundant supply and will be delivered to meet your own schedule.

For fast, reliable ammonia service, call or write The Texas Company, *Petrochemical Sales Division*, 332 South Michigan Avenue, Chicago 4, Illinois, or 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO

PETROCHEMICALS



Continentals' NEW (patented)

Hydraulic Tripper

handles all materials safely — with NO ELECTRIC CONTROLS!

This entirely new Continental Hydraulic Tripper offers unique advantages —

- No electric trolley wires — no cable reels — no line maintenance
- Hydraulic controls throughout; fully enclosed hydraulic system
- Belt-powered through hydraulic motor to tripper wheels
- Hydraulically operated spring-set brakes position tripper without creep, crawl, or accidenal release
- No clutches or friction drives to corrode during down time

CAN BE SUPPLIED WITH FIRE-RESISTANT MATERIAL IN HYDRAULIC SYSTEM!

Call, wire or write your nearest Continental office for details.

ATLANTA • DALLAS • KNOXVILLE CGC MEMPHIS • MOBILE • NEW YORK 17

INDUSTRIAL DIVISION

Continental Gin Company

BIRMINGHAM ALABAMA

changes

PCA Appoints International Ore

John W. Hall, vice president, Potash Company of America Ltd., returned mid-October from a trip to Europe and Japan. The purpose of the trip was to investigate the world Potash market and to select a representative to sell a portion of his Company's Canadian production of Potash in the export market.

Mr. Hall has announced that International Ore and Fertilizer Company of New York will represent Potash Company of America, Ltd., in Japan, Australia and New Zealand. Coverage for other areas will be determined later.

Smith-Douglass, Wilson and Toomer Merger?

Possibility of a merger of the Smith-Douglass Co., Inc. and Wilson and Toomer Co., has been revealed in Norfolk, Va., by Willard R. Ashburn, Smith-Douglass president. He said stockholders of the two fertilizer manufacturing organizations, both of which have their major operations in the Southeast, have come to no decision in the matter.

Smith-Douglass, which is headquartered in Norfolk, operates 11 plants in ten cities, while Wilson & Toomer has six plants in Florida and Georgia. Founded in 1893, it is headquartered in Jacksonville. Smith-Douglass, which was founded in 1921, has enjoyed its greatest growth since the end of World War II.

Smith-Douglass' last expansion was the acquisition of Texas City Chemicals, Inc., in the fall of 1957. Earlier it acquired the Coronet Phosphate Co., which has large land holdings in Florida, and the San Jacinto Chemical Co. of Houston, Texas. Other plants are located in Virginia, North Carolina, Illinois and Minnesota. The last available Smith-Douglass fiscal report shows sales for the year in excess of $37,000,000.

In addition to manufacturing fertilizer, Wilson and Toomer produce insecticides and pesticides.

Wilson & Geo. Meyer

Wilson & Geo. Meyer & Co. announced from its San Francisco headquarters on Oct. 1 the opening of a new sales office in El Centro, Calif.

At the same time, Wilson & Geo. Meyer & Co. Intermountain, an affiliate company, announced opening

For uniformly conditioned mixed goods, use

Du Pont UAL-S

Here's how it works . . .

New Du Pont UAL-S permits you to take advantage of the well-known conditioning effect of sulfates in fertilizers. A small amount of ammonium sulfate added in a finely dispersed form as in UAL-S is equivalent to a much larger amount added dry to the mixture . . . ammonium sulfate means better, more uniform conditioning. All of your fertilizers will benefit from nitrogen derived from UAL-S, because it combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur . . . an essential plant nutrient with recognized agronomic value.

Regular mixtures cure well with UAL-S, are free-flowing and resist caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well. UAL-S is non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum, and it's safe—handles at moderate pressure, and there's no danger of flash fires.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, fill out and mail the coupon.

PROPERTIES OF UAL-S

Nitrogen Content	42.5%
Freezing Point	20°F.
Pressure	15 psi at 60°F.
Specific Gravity	1.13
Fixed to Free Ratio	.9 to 1.0

Composition: Parts 100

Urea	38.8
Ammonium Sulfate	10
Ammonia	27.1
Water	15.1
CO_2	9.0

Du Pont UAL solutions in mixed fertilizers have helped American farmers grow better crops for 25 years.

URAMON®

AMMONIA LIQUORS

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Department, Room 2539-W
Wilmington 98, Delaware

Dear Sirs: Please send me more information on UAL-S.

Name_____

Firm_____

Address_____

City_____ State_____

MURIATE
OF POTASH
for the
PLANT FOOD INDUSTRY

THIS symbol stands for high-grade uniform, coarse and granular Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash
Corporation

61 BROADWAY • NEW YORK 6, N. Y.

of a new sales office in Twin Falls, Idaho, and enlargement of its sales staff at Salt Lake City.

The El Centro office will be in charge of Leland Oberholser. The new sales office in Twin Falls, will be in charge of Marlowe Wood.

James Burley has been added to the Salt Lake City sales staff of the Intermountain company.

A.A.C. Buys Knoxville

The American Agricultural Chemical Company announced that it has contracted to purchase substantially all the physical assets of Knoxville Fertilizer Company with plants at Knoxville, Nashville, Johnson City, Tennessee and London, Kentucky. These plants will be operated as the Knoxville Fertilizer Division of The A.A.C. Co. under the management of the present Knoxville Fertilizer personnel. The well known line of Knox Fertilizers will continue to be sold.

Georgia Fertilizer Buys

The Georgia Fertilizer Company of Valdosta, Ga., has purchased the Valdosta division of the Southern Cotton Oil Company.

A spokesman for the local fertilizer concern said the new acquisition by his company would not immediately alter the policies and services of Southern Cotton Oil.

It was also pointed out that the same personnel will continue to be employed.

New Green Dew Branch

Establishment of a new branch of the Green Dew Farm Chemical Co. in St. Paris, O., was announced by Henry Troyer, Sr., president of the firm with headquarters in Plain City, and John Steinberger, Jr., who will operate in St. Paris.

Sun-Olin Formed

Sun-Olin Chemical Co., a joint subsidiary of Olin Mathieson Chemical Corp. and Sun Oil Co., has been formed to produce urea. Officers and directors for the new company have been announced by the two parent firms.

James I. Harper of Sun has been named president and the vice president is S. S. Johnson of Olin Mathieson. Other Sun-Olin officers are: J. R. Sanderford, secretary and assistant treasurer; Joseph T. Wilson, Jr., treasurer and assistant secretary; and Joseph R. Layton, comptroller. Sanderford is from Olin Mathieson and Messrs. Wilson and Layton are from Sun Oil.

The new company's registered offices are at 100 West Tenth Street, Wilmington, Del.

Arcadian® News

Volume 3 | For Manufacturers of Mixed Fertilizers | Number 11

MAKING SEMI-GRANULAR FERTILIZERS WITH STANDARD ROTARY EQUIPMENT

The growing demand for higher analysis fertilizer grades has stimulated interest in the use of sulfuric acid to make these higher grades. Although sulfuric acid is not essential for such formulations, it has been found that its use often increases agglomeration of finer particles to yield a fertilizer of superior appearance and condition. To take full advantage of this, experience has shown that a special type of ammoniating solution—such as Nitrogen Division's NITRANA® 3MC—is required.

Special Technique Required

Probably the most important factor in producing semi-granular fertilizers is the uniform distribution of sulfuric acid and ammoniating solution into the dry ingredients. The higher the analysis, the less latitude is permissible to get good results—just as in ammoniation alone. And, since sulfuric acid is introduced *before* the ammoniating solution in the semi-granulation process, any error in handling this liquid makes proper introduction of the other liquid far more difficult! In simple ammoniation, the careless operator gets no more than a powerful whiff of free ammonia. But in semi-granulation, the careless operator can cause a variety of additional hazards, such as dense white fumes, dense brown fumes, and flashes of fire which usually appear as sudden violent puffs!

Oxides of nitrogen produced in flash fires and contained in brownish fumes present a serious safety problem, in addition to causing analysis difficulty in the final product. Accordingly, the breakdown of ammonium nitrate by sulfuric acid *must* be minimized. Therefore, good spray pipes must be used, and these usually require considerable custom fitting right on the job because of differences and limitations of the equipment available. The orifices in the pipes must be kept as small as possible to control the speed of introduction of liquids by these orifices instead of relying on line valves. Throttling of a line valve often causes poor distribution due to lack of pressure at the spray pipe orifices.

Technical Tips for Better Ammoniation

Points to Remember

For the best possible results in semi-granulation, the producer would do well to check his equipment and procedure against these eight important points:

1. Spray pipes should be as simple as possible and easily removable to minimize maintenance costs. Stainless steel is preferable for solutions, while extra heavy black iron is suitable for acid.

2. Dry superphosphate and a low water, high ammonia and ammonium nitrate content solution, such as NITRANA 3MC, are necessary.

3. All dry materials should be screened to remove large lumps, as in good pulverized fertilizer practice.

4. 66°Be′ sulfuric acid (93.19%) seems to be best in most cases. With very dry superphosphate, 60°Be′ (77.67%) may be used. 98% sulfuric acid is probably a little more difficult to distribute safely in the mixer without causing fumes; and it also has a freezing point that is a bit too high for use in cold locations.

5. Use of uniform coarse filler or granulated potash will help reduce fines in the finished product. Obviously, the less very fine material, the less agglomeration necessary.

6. Cooling of the semi-granulated material is always necessary, whether by rehandling or by rotary cooling.

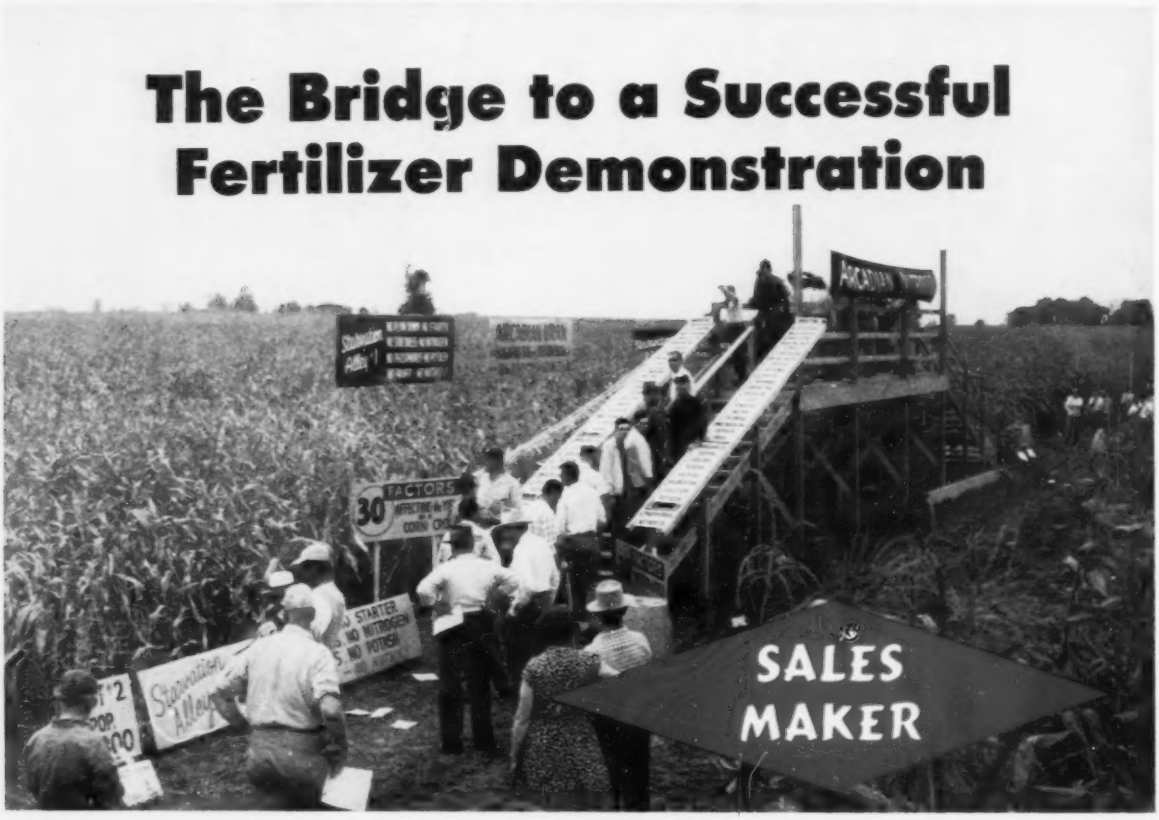
7. The usual starting practice is to charge all dry materials, introduce all sulfuric acid, and then introduce solution. Time of rotation before discharge may vary. Most grades may be discharged immediately after ammoniation.

8. Reversion of P_2O_5 has not been a problem even at fairly high manufacturing temperatures—250°F.—because material is of low moisture content and is cooled within 24 hours.

For more specific information on any of these factors or any problem related to making semi-granular fertilizer, write to Technical Service, Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N.Y. Phone: HAnover 2-7300.

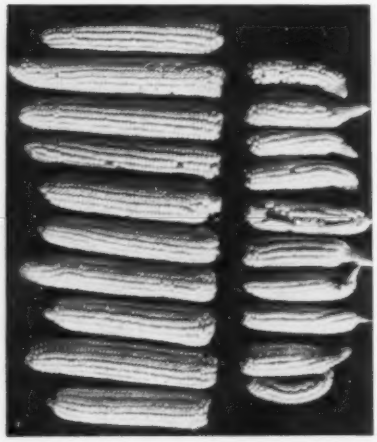
Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

The Bridge to a Successful Fertilizer Demonstration



One of the best ways to sell fertilizer is to develop a carefully-planned field demonstration to show the big profit that can be made from fertilizer—and get thousands of farmers to come and see it.

Such a demonstration was sponsored by Nitrogen Division, Allied Chemical, at The Prairie Farmer Farm Progress Show, September 24 and 25, which was attended by more than 215,000 farm people.



WITH and WITHOUT fertilizer.

The aim of the demonstration was to show a striking comparison between well-fertilized corn and corn with no fertilizer. Three one-acre plots received a well-balanced, high-nitrogen, complete fertilizer program. Two one-acre check plots received no fertilizer, and these were real "starvation alleys."

An important feature of the demonstration was an observation bridge constructed so that farmers could get a good view of the corn plots at pre-harvest stage. Thousands of farmers and their families crossed the bridge, studied the plots, and visited the Nitrogen Division tent to get more facts about proper fertilization.

Careful Planning and Preparation

Work on the demonstration started nine months before the Show. The field was typical farm land, not too fertile. It had been in unfertilized pasture for two years. Soil tests showed that the soil needed lime and that it contained about 75 pounds of nitrogen, 65 pounds of phosphorus and 100 pounds of potash per acre.

The soil was limed and a complete fertilizer program was prepared and followed. This included plow down of the equivalent of 1,500 pounds of 10-10-10 fertilizer per acre, followed by 130 pounds of 12-12-12 starter fertilizer and a top-dressing of 50 pounds of nitrogen.

Corn was planted on May 4, using 20,000 kernels per acre. Starter fertilizer was applied to one side and below the seed. An insecticide was applied to control soil insects. The corn was cultivated only once—enough to control weeds.

Difference was Easy to See

The season was wet and cold with little sunshine. But the fertilized plots came through in fine shape. The "starvation alleys" without fertilizer lived up to their poor prospects. The contrast was wonderful! You could see the difference a quarter mile away. All plots were big and wide so that the check plots got little help from the fertilized plots.

Each plot was marked with an easy-to-read sign, placed low along the ground or high above the tassels so that it would not interfere with the view, and be easy to photograph with the crop. The observation bridge was really a

30-foot platform with 25-foot approaches at each end. Going up the steps and across the bridge, the crowd had time and opportunity to get an excellent view of the entire area of all the plots. Before their eyes was a striking picture of the difference fertilizer makes in the growth and yield of a corn crop.

Along the railings of the stairs leading to the platform were lists of 30 factors affecting the yield of corn, starting with nitrogen, phosphorus and potash and continuing through other factors all the way to harvesting.

Big Profit from Fertilizer

Yields from 1/100 acre had been harvested from each plot and placed in a basket in front of the plot. Visitors were invited to guess the yield of each plot and turn in their estimates to compete for prizes. This helped to stimulate more interest and make the viewers examine the plots carefully.

There was a big difference in yields and profits between the fertilized and the unfertilized plots. Fertilizer produced 151 bushels per acre, as compared to 44 bushels with no fertilizer—an increase of 107 bushels for fertilizer.

Moisture was 10% lower in the fertilized corn and protein content was 2½ to 3½% higher. Assuming that 60% of the fertilizer was used by this year's crop, and figuring corn at $1 per bushel, the fertilizer paid a big profit.

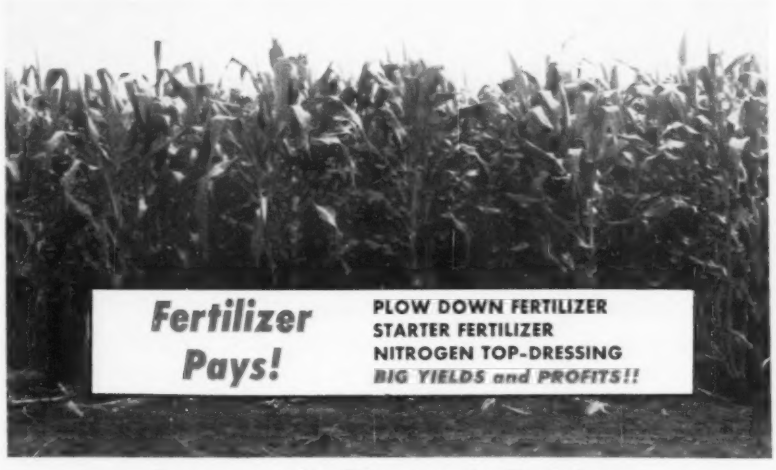
Farmers Were Convinced

There was every indication that the demonstration was a huge success. Many favorable comments were heard—"If this demonstration doesn't convince farmers to use fertilizer, nothing else can". . ."You have told the story with the corn plots, the signs, the approaches and the bridge better than if a book had been written on the subject". . ."This is the best fertilizer demonstration I have ever seen anywhere!"

Lessons learned from this demonstration: allow yourself plenty of time . . . make all your plans and preparations well in advance . . . make sure you get a striking difference in growth and yield . . . test the soil and give it what it needs . . . use big plots . . . use plenty of the right fertilizer and plenty of good seed for thick spacing . . . put up easy-to-see, easy-to-read signs . . . arrange a field day just before the crop matures when corn is at its best . . . attract thousands of farmers and provide them with a good vantage point from which to view the whole field so they can see the profits from fertilizer.

Nitrogen Division exhibit tent at demonstration.

"Starvation Alley" where no fertilizer was used.



Farmers saw a big difference on fertilized plots.

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	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. in. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6	42.0	19.5	66.3	6.0	8.2	9.3	1.178	10	34
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

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Guidepost to BULK BLENDING

AN INNOVATION IN FERTILIZER MARKETING . . . .

(With Special Reference To Illinois)

By

Billy J. Bond

and Harold G. Walkup[1]

Preface

The study which is reported here was conducted in Illinois during the period January 1957 to June 1958. It represents a joint research effort by the University of Illinois and TVA. The purpose of this report is to show the costs of operating various types of bulk-blending plants at different levels of output, and to compare the costs to farmers of fertilizing in the bulk-blended and conventional-mixed manner. For those who are already engaged in the bulk-blending business, it is hoped this publication will provide a basis for an improved understanding of the economizing aspects of their plant operation. For those who plan to go into the bulk-blending business, this publication will provide some guideposts to economic plant establishment and operation. Following the findings of this publication does not constitute a guarantee of success. The business of fertilizer bulk blending, like any other, requires hard work, business know-how, and a great deal of selling to potential farmer customers before success may be achieved.

INTRODUCTION

Fertilizer bulk blending is a new and growing way to market fertilizer. During the last ten years, it has evolved out of the needs of a fast growing industry. The name "'bulk blending" means that this marketing method includes simple, or nonchemical, mixing and bulk handling of straight fertilizer materials. By storing at least three straight fertilizer materials—one for nitrogen, a second for phosphorus, and a third for potash—a plant operator can mix any ratio a farmer wants. This marketing method combines in one agency the usual functions of mixing and the wholesaling and retailing of mixtures. In addition, it often includes custom spreading.

Growth of Bulk Blending

The birthplace of large-scale bulk blending is in the Midwest. The first mixing plant was built in north-central Illinois, in Woodford County, in 1947. But early growth was slow. By 1953 only 14 bulk-blending plants were operating in Illinois. Since then, however, the number of plants has increased rapidly. Ninety-two registered plants are now operating in Illinois and more are being built. Rapid growth of the fertilizer bulk-blending industry is occurring also in other midwestern states, such as Indiana, Iowa, Michigan, Minnesota, and Missouri.

Bulk Sales Sizeable

Total sales through fertilizer bulk-blending plants in Illinois are sizeable. Sales include not only the blended materials, but also a large volume of straight materials for which blenders are well set up. In 1956, 75 bulk-blending plants in Illinois sold 91,700 tons of straight materials, including rock phosphate. Nearly 63,000 tons, or 68 percent, of these materials were blended. Bulk blenders also sold nearly 126,000 tons of rock phosphate in support of the state's soil fertility "build-up" program. Very little of the rock phosphate was used in blends. In total, sales of all straight materials (including rock phosphate) by bulk blenders in Illinois amounted to 26 percent in 1956. Future growth of bulk blending will depend on its acceptance by farmers and the services provided by bulk blenders.

No clear-cut single reason can explain the development and growth of fertilizer bulk blending. Rather, a series of events, certain research and mechanical achievements, and several conditions in and outside the industry appear to explain the advent of bulk blending.

How Bulk Blending Started

At first, a crude form of bulk blending was achieved when farmers in Illinois spread a few bags of potash over the rock phosphate which they spread on their fields in the fall. This "rough and ready"—but apparently successful—blending led to experimenting with additional materials which would blend well. Bulk blending requires materials which do not react chemically and which do not segregate much after mixing. Straight materials used most often now for bulk blending are ammonium sulfate for nitrogen, concentrated superphosphate for phosphate, and muriate of potash for potash. The granulated forms of these materials are generally preferred because they have less tendency to segregate, and because of their improved drillability or spreadability from a fan-type spreader.

Advantages of Bulk Blending

Bulk blending often ties in well with existing conditions in many agricultural areas and in the industry: (1) A blender can formulate on the spot any fertilizer ratio which a soil test shows is needed. (2) Mixtures from lower-cost, straight materials can be formulated and additional filler to bring mixtures "up to weight" is not handled. (3) The fertilizer industry and farmers can take advantage of economies inherent in unrefined application methods which now seem to be warranted. This is because our present method of soil testing does not show specific locations and the size of random variations in fertility existing in a field at the time fertilizer is spread. (4) A fertilizer retailer can handle an adequate amount of material so that fertilizer can become a principal "money-maker" in his business. (5) Mixers in states that have less stringent fertilizer standards laws ca. mix "approximate" infinite mixes at substantially lower costs than they could with the more com-

[1]Graduate Assistant, Department of Agricultural Economics, University of Illinois; and Agricultural Economics Branch, Division of Agricultural Relations, Tennessee Valley Authority, respectively.

The authors wish to acknowledge and express appreciation for suggestions made by several staff members of the Agricultural Relations Division relative to the preparation of this publication. Also, the cooperation and assistance of Dr. Earl R. Swanson, of the Department of Agricultural Economics of the University of Illinois, was particularly helpful and appreciated.

A detailed technical presentation of the results of this study can be found in Bond, B. J., and Earl R. Swanson **A Cost Analysis of Fertilizer Bulk-Blending Plants in Illinois,** Illinois Agricultural Experiment Station Bulletin No. 63, June 1958.

plicated chemical mixing. (6) The economic benefits inherent in bulk handling are retained throughout the manufacturing, transporting, storing, and spreading processes.

A main advantage of buying plant nutrients through bulk-blended materials is lower cost to farmers. Bulk-blended fertilizers on an equivalent plant nutrient basis usually cost from $8 to $12 less per ton at the plant than conventional mixes in bulk. Table 1 shows cost advantages of bulk blends in some of the principal analyses used by Illinois farmers.

Table 1. A Comparison of Retail Costs to Farmers of Principal Grades of Blended and Conventionally Mixed Fertilizers, Illinois, September 15, 1957.[1]

Analysis	Conventional mix in bulk		Bulk-blended[3]		Price Difference
	Price[2]	Total Lbs.	Price	Total Lbs.	
3-12-12	$50.00	2,000	$41.80	1,219	$ 2.80
4-16-16	65.00	2,000	54.80	1,625	10.20
5-20-20	78.00	2,000	67.80	2,032	10.20
10-10-10	66.00	2,000	53.95	1,732	12.05

[1]Based on average prices paid by Illinois farmers for fertilizer materials. **Agricultural Prices,** September 15, 1957, USDA.
[2]For bagged prices add $5 per ton.
[3]Bulk blends consisted of mixtures of ammonium sulfate, concentrated superphosphate, and muriate of potash.

PLANT COMPONENTS AND COSTS

Operators Preferences

A typical blending plant requires three kinds of capital investments: land, shelter, and equipment. Plant operators prefer a plant site with a railway siding, a high-voltage power line, a network of farm roads, and good fire protection. Plant sites vary in price depending on urban or rural locations; however, adequate sites sell for about $1,500. When bulk blending is considered an addition to existing enterprises—such as a grain elevator, bagged fertilizer, or feed—land for the plant site is usually available.

Freight Car Unloading

Freight car unloading facilities usually include a platform runway attached to the plant and to the rear of the storage bins, and it is as high as the floor in the freight car. Fertilizer materials are transferred from the freight car into the storage bins in either of two ways: by a bulk loader moving across the platform and dumping directly into the bins; or by a bulk loader dumping materials into an elevator which empties into the bins. Under-the-track conveyors which feed into an elevator are used for unloading hopper cars in a few plants. But only a few such hopper cars are now available for raw-material shipments.

Building Costs

Structure costs depend not only on the size of the building but also on the type and quality of materials used (Table 2). The kinds of buildings presently being used to shelter equipment and raw materials cost from $4,000 to $60,000.

SUMMARY

- **The practice of bulk blending straight materials has expanded greatly in Illinois. Between 1947 and 1957 the number of bulk-blending plants has increased from none to 92. In 1956 bulk blenders distributed 26 percent of all straight materials consumed in Illinois.**
- **Three types of plants are ordinarily constructed for bulk blending. These are: (1) horizontal-flow, (2) vertical-flow, and (3) combined horizontal-vertical flow. The horizontal-flow plants have initial investment costs of about $25,000; combined horizontal-vertical, $45,000; and vertical, $72,000. Land constitutes a small percentage of the total investment cost—about $1,500. In the horizontal and combined horizontal-vertical plants, the remainder of the investment cost is divided almost equally between buildings and equipment. In the vertical plants, equipment costs are considerably higher about 30 percent in vertical-type plants.**
- **Horizontal-type plants have an hourly output capability of about 10 tons per hour; combined horizontal-vertical, 13 tons per hour; and vertical, 16 tons per hour. When an additional man is added to the enterprise, output is increased about 10 percent in horizontal and combined horizontal-vertical plants, and about 30 percent in vertical type plants.**
- **Variable costs, excluding the cost of straight materials (about $37.00 per ton), vary from about $1.1[illegible] per ton in horizontal-type plants to $1.40 in vertical-type plants. Adding an additional man to the enterprise increases the variable cost per ton by about 10 cents. Increases in variable cost per ton are partly offset by decreased fixed costs per ton when an additional man is added to the enterprise to increase hourly output.**
- **Blending plants charged an average of $2.85 per equivalent ton of 10-10-10 for blending materials. The margin between the purchase and retail price of straight materials amounted to $8.10 per equivalent ton. A total of $10.95 was available for paying the fixed and operating costs of the blending plant. With an 8-hour day and continuous operation, horizontal-flow plants had a break-even volume of about 780 tons and required about 9.5 days of operation to blend this volume; in combined horizontal-vertical plants, about 1,100 tons and 10 days; and in vertical plants, 1,500 tons and 9 to 12 days.**
- **Storage requirements for the various blending plants depended on the daily output and in-transit delivery times for raw materials. The ratio between potential daily output and storage capacity varied from 1:27 to 1:15 in the various plants, while a ratio of 1:10 was required to be sure no scheduling problems were encountered.**
- **Spreading operations offered two sources of revenue to the bulk-blending enterprise: (1) revenue from the spreading charge, and (2) revenue from an expanded market area (increased blending volume). An average of $1.15 per acre is charged for spreading 300 pounds of fertilizer per acre, which means $7.75 revenue is received per ton to cover fixed and variable costs of spreading. Profitable expansion of the market area depended on the net effect of increased delivery costs per ton and decreased blending costs per ton. Spreader trucks can now be operated at a loss and still be profitable to the blending enterprise because of increased blending volumes.**
- **The cost advantage to farmers of bulk-blending fertilizer over bulk-cured conventional mixes varied from $8 to $12 per ton. In addition, farmers used the spreading service offered by blenders to reduce the demand for their labor during peak working months. Farmers bought blended fertilizer and had it spread on their farms by a spreader truck for about the same price as conventionally mixed fertilizer costs them, without being spread.**

A typical bulk-blending plant structure showing elevated blending equipment shelter, platform used in unloading freight cars, and storage bin shed.

Table 2. Estimated Plant Structure Costs, Central Illinois, 1957

Type of Construction	Mixing room	Storage bins	Wiring
	Cost per square foot		
Pole supported, metal siding			(a) $200 for plant entrance
Low quality	$1.75	$2.75	(b) $5-10 per light outlet
High quality	2.75	3.75	(c) $50-$300 per motor outlet
Frame			
Low quality	2.00	2.00	
High quality	2.50	4.50	plus 65c for non-partitioned
Concrete Block	2.50	4.50	bin walls.

Shelter Vital

Both raw materials and equipment must be protected from moisture with shelter; weather speeds up equipment corrosion and raw material deterioration during storage. Present bulk-blending structures consist of remodeled buildings, such as warehouses or barns, or structures built primarily for bulk blending. The old buildings are partitioned into storage bins and a mixing room, or—in a few instances—into storage bins with space added for the mixing room.

Structures differ in appearance depending on space needed for blending equipment, number of storage bins, and the arrangement for unloading raw materials from freight cars. Blending equipment can be spread out on the mixing-room floor, or elevated in a vertical or tower arrangement. Storage bins are rather uniformly rectangular, but they differ between plants in number, capacity, and quality.

TYPE OF EQUIPMENT

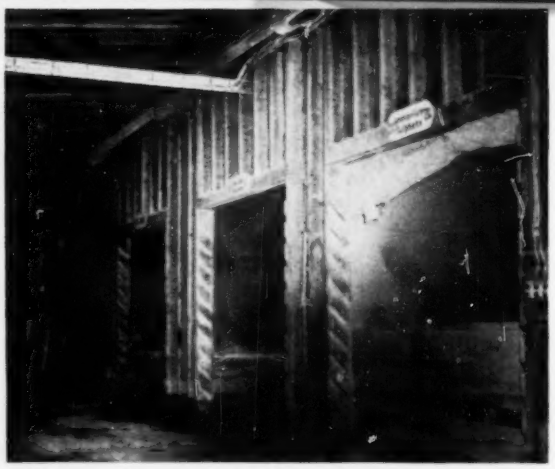
Five Kinds

Basically, five kinds of equipment are used in bulk blending of fertilizers: moving, holding bins (including vibrating screens) and hoppers, weighing, mixing, and grinding equipment.

Moving Equipment

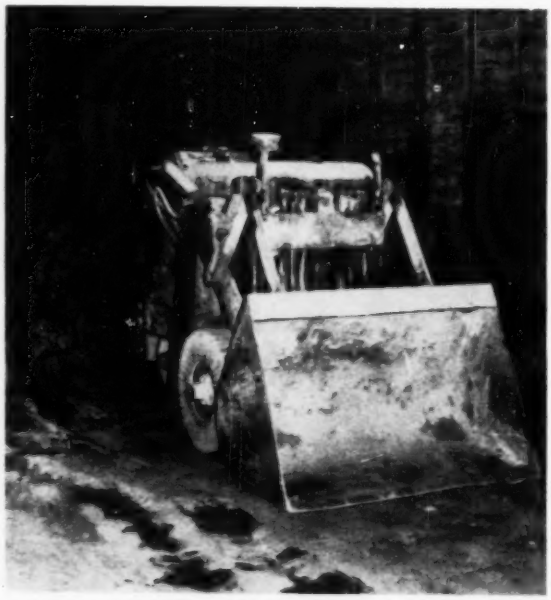
Plant operators use bulk loaders for moving raw materials in most bulk-blending plants; they are fast, maneuverable, and efficient in handling loose materials in close quarters. Tractors with loaders replace bulk loaders in some plants, but they are not as maneuverable. Tractors and bulk loaders used in blending plants have a bucket capacity of 1,000 pounds.

Bulk loaders cost $4,000 to $5,000, and tractors from $2,700 to $3,200. Augers, elevators, and belt conveyors are sometimes used to move fertilizer materials. Augers cost $2.50 per foot, plus the cost of a power unit; however, fertilizer materials can easily overload augers. Elevators cost from $1,200 for a 20-foot elevator to $4,000 for a 60-foot elevator. Plant operators recom-

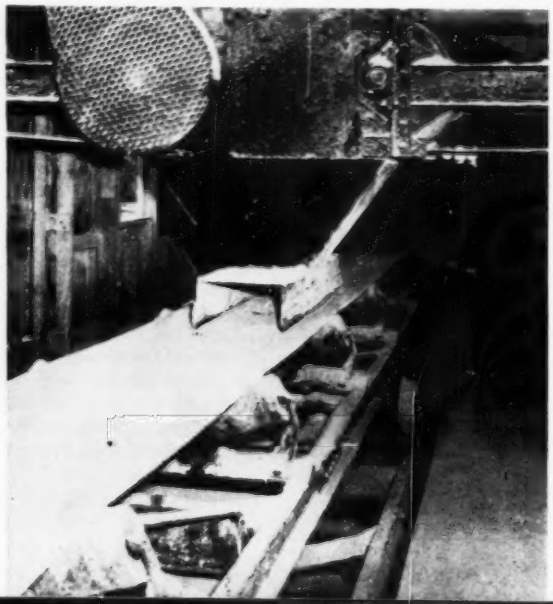


Bulk blending plant storage bins. Storage bins are located adjacently so that materials give mutual support to partitions. Also, entrance ways are easily accessible to bulk loaders and close to mixing equipment.

A fertilizer bulk loader. This mechanical "beast-of-burden" facilitates the movement of bulk fertilizer material like that seen behind the loader.



An overhead, movable belt conveyor installed to distribute straight fertilizer materials to the storage bins. Where it is possible to use them, operators prefer belt conveyors instead of augers or elevators.



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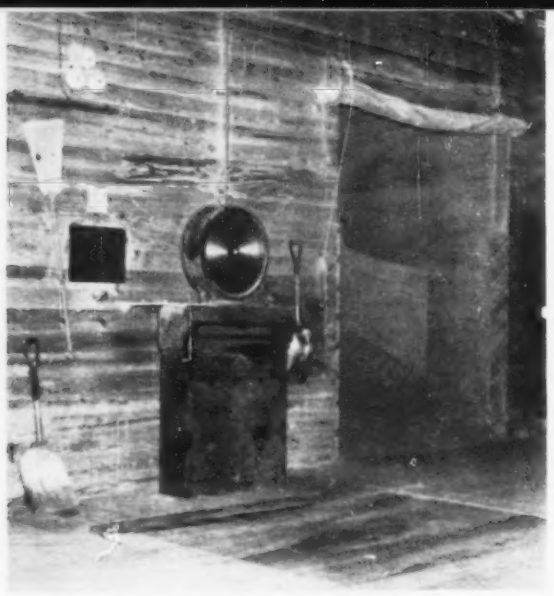


A drive-on platform scale with dial. This scale is designed so that the bulk loader's weight registers on the balance arm and only the weight of the fertilizer material registers on the dial.

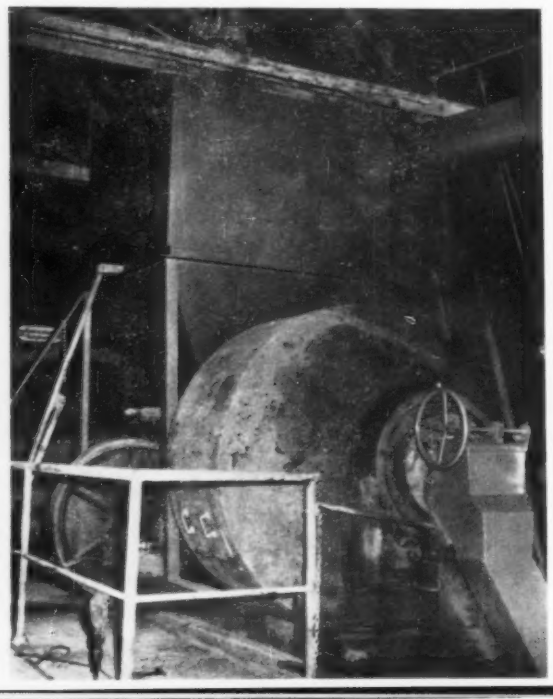
mend that chains and sprockets in the elevator be replaced by belts because of the highly corrosive fertilizer materials. A distributor and spouting used in filling storage bins add $1,800 to $2,000 to an elevator's cost. Belt conveyors are replacing both augers and elevators in many plants. Conveyors are cheaper, do more work, and need less maintenance. A reversible, permanently installed 30-foot section of 18-foot belt costs from $1,600 to $2,000. A portable section of conveyor belt costs slightly less.

Weighing Equipment

Scales are used to weigh raw materials going into blend batches during blending. When materials are weighed before batching, a floor-level platform scale with a dial is used. The operator drives the bulk loader onto the platform and notes how much the material weighs. This type of scale unit costs from $900 to $1,200.

If materials are weighed during batching, this is usually done in one of two ways. The operator of the bulk loader dumps materials into a floor-level hopper attached to a scale dial or balance. The weight of the materials is recorded on the dial or balance. This scale unit can be low-capacity, since the bulk loader is not weighed. Cost is from $700 to $900. In plants having overhead holding bins, suspended hopper scales or batchers are used. The plant operator controls the weighing of materials from the holding bins into the batcher. The weight of the materials is registered on a scale dial or balance located near the valve controls of the holding bins. Air-controlled discharges are used on the bin valves for fast and easy operation. One- to two-ton batchers cost from $3,500 to $4,500.

A holding bin and drum-type mixer. This holding bin, which is also a batcher, holds the straight material batch until just before it is emptied into the mixer.



Holding Bins Needed

Holding bins are used as temporary storage for both raw materials and the blended product. For holding bins to operate efficiently, they are built with steep sides. Holding bins with a 10- to 25-ton capacity cost from $500 to $700. Vibrating screens are frequently located above the holding bins to separate out lumps which impede the material flow. Vibrating screens cost from $1,700 to $2,000. When the holding bin valves are air controlled, air-pressure systems costing $600 to $800 are installed. Floor intake hoppers with a screw in the bottom of the hopper are used as material dumps for feeding raw materials into elevators. Floor hoppers cost $300 to $600.

Two Types of Mixers Blend Materials

Drum-type mixers are used in most plants. With this mixer a tumbling action resulting from closely spaced blades attached to the inside of a slowly rotating drum blends the fertilizer materials. These mixers hold from 0.5 to 2.5 tons of materials and mix each batch in 2 to 4 minutes. They cost from $3,000 to $4,000.

Converted feed mixers are used in a few plants. These mixers, reinforced to handle fertilizer materials, have a high mixing speed. The mixing principle consists of blades rotating within a stationary outer shell. These mixers hold about 1 ton, and they mix each batch in 1 to 3 minutes. These mixers cost from $500 to $3,000.

Hammer mills are used in many plants to pulverize lumps in the raw materials. They cost from $300 to $500.

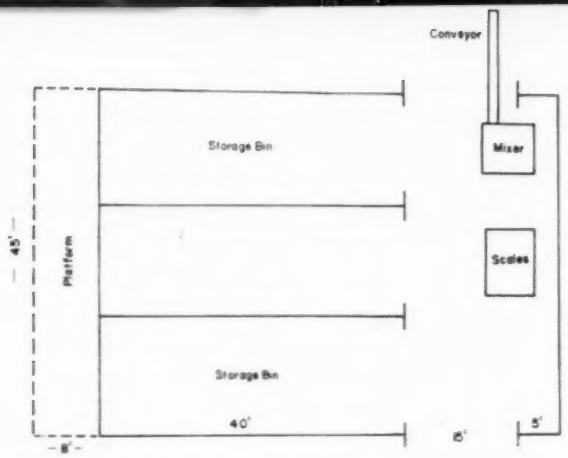
ORGANIZATION AND OPERATION OF PLANTS

Types of Structure and Equipment Layouts

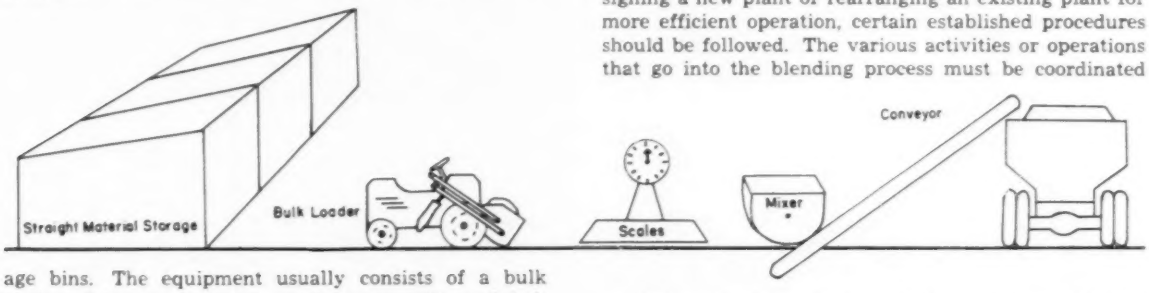
Bulk-blending plants are divided into three types, depending on the primary direction of material flow through the blending process. These are (1) horizontal-flow plants, (2) vertical-flow plants, and (3) combination horizontal-vertical-flow plants. Each plant type has a particular kind of equipment arrangement and structural layout, as well as different amounts and kinds of equipment.

Horizontal Material Flow

In the horizontal-flow-type plant, the blending equipment is located on the plant floor. Materials flow from one operation to the other by horizontal movements. This type of plant ordinarily has a minimum of equipment and storage capacity and a relatively low capacity for output; therefore, the shelter requirement is low. A rectangular-type structure is used, with space divided between the equipment and material stor-



Above—A floor plan of a typical horizontal-flow-type fertilizer bulk-loading plant.
Below—A profile of equipment and facilities used in a typical horizontal-flow-type bulk-blending plant. Straight materials are removed from storage bins by bulk loader which is driven onto the platform scale for weighing. The bulk loader is then moved to the mixer, into which straight materials are dumped for mixing. In this case, the mixer also acts as the batcher. After mixing, the blended materials empty onto the conveyor, which elevates the blended material into the truck.



age bins. The equipment usually consists of a bulk loader, drive-on scale, mixer, hammer mill, and belt conveyor. The bulk loader is used to move materials from storage bins to the mixer—the materials being weighed by the bulk loader stopping on the scale. After mixing, the blended product is carried to a truck by an inclined conveyor belt.

Vertical Material Flow

In the vertical-flow-type plant, the blending equipment is elevated in a vertical or tower arrangement. Materials flow from one operation to another by gravity. This type of plant ordinarily has much equipment and storage capacity and it requires a large shelter. The floor space needed for blending equipment, however, is reduced. A structural steel tower covered with either wood or metal siding extends above the building roof to shelter the blending equipment. The equipment usually consists of a bulk loader, floor hopper, elevator, hammer mill, overhead holding bins, vibrating screen, batcher, and mixer. The bulk loader moves materials from storage bins to the elevator, where they are elevated to the overhead holding bins. A vibrating screen over the holding bins separates out lumps which are passed through the hammer mill to be pulverized. The operator weighs the materials from the holding bins into the batcher. From the batcher, materials pass into the mixer, are blended, and then drop into a waiting truck.

Combined Horizontal-Vertical Material Flow

The combined horizontal-vertical-flow-type plant borrows features from the other two plant types. Equipment is added to that normally used in a horizontal-type plant. Storage capacity and shelter requirements are normally intermediate between horizontal- and vertical-type plants. Generally, a mixing room is partitioned from the storage bins. The equipment usually consists of a bulk loader, platform scales, hammer mill, floor hopper, two elevators, holding bin, mixer, and enclosed auger. An inclined conveyor belt is sometimes substituted for one elevator and the auger. The bulk loader moves materials from the storage bins to the elevator—stopping on scale en route to weigh the individual materials. Materials are dumped into a floor hopper, passed through a hammer mill and elevated to a holding bin located above the mixer. Then the materials either fall directly into the mixer to be mixed, or they are held in the holding bin until the mixer is emptied. After mixing, the blended product is moved to a truck by another elevator and overhead auger or conveyor belt.

Operating Aspects of Blending Plants

The efficiency with which fertilizer materials flow through the blending process is largely determined by the amount and arrangement of the equipment. In designing a new plant or rearranging an existing plant for more efficient operation, certain established procedures should be followed. The various activities or operations that go into the blending process must be coordinated so that materials move through the plant smoothly and with a minimum of delay. All or part of six distinct operations are performed in the bulk-blending process. These are:

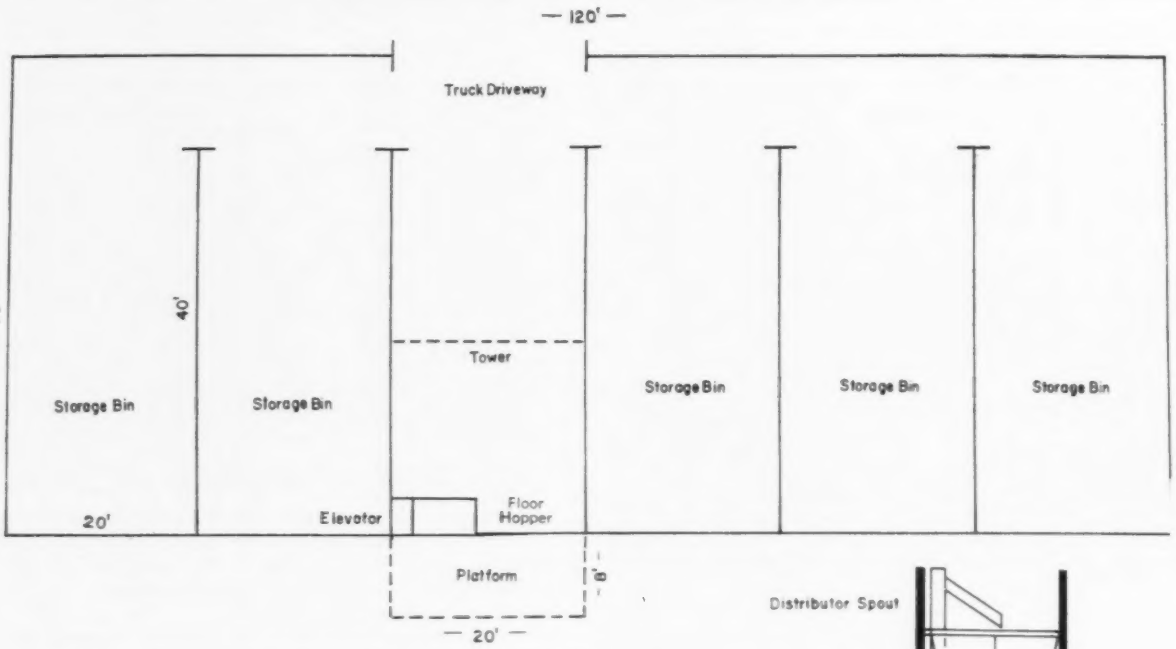
OPERATION 1 is a combination of starting, adjusting, and stopping equipment. With continuous output the equipment runs constantly; under variable output conditions the equipment is started and stopped many times. Under normal operating conditions this operation requires less than one-half minute per ton.

OPERATION 2 consists of filling temporary storage bins (holding bins) with materials from the permanent storage bins. Normally, the operation is performed only in vertical-flow-type plants. The time to complete this operation varies from 1 to 3 minutes per ton, depending on the methods used in moving the materials.

OPERATION 3 consists of moving materials from permanent or temporary storage to the scale and weighing the materials. In vertical-flow plants this operation takes from 0.8 to 1.4 minutes per ton; in the other two plant types it takes from 1.5 to 2.3 minutes per ton.

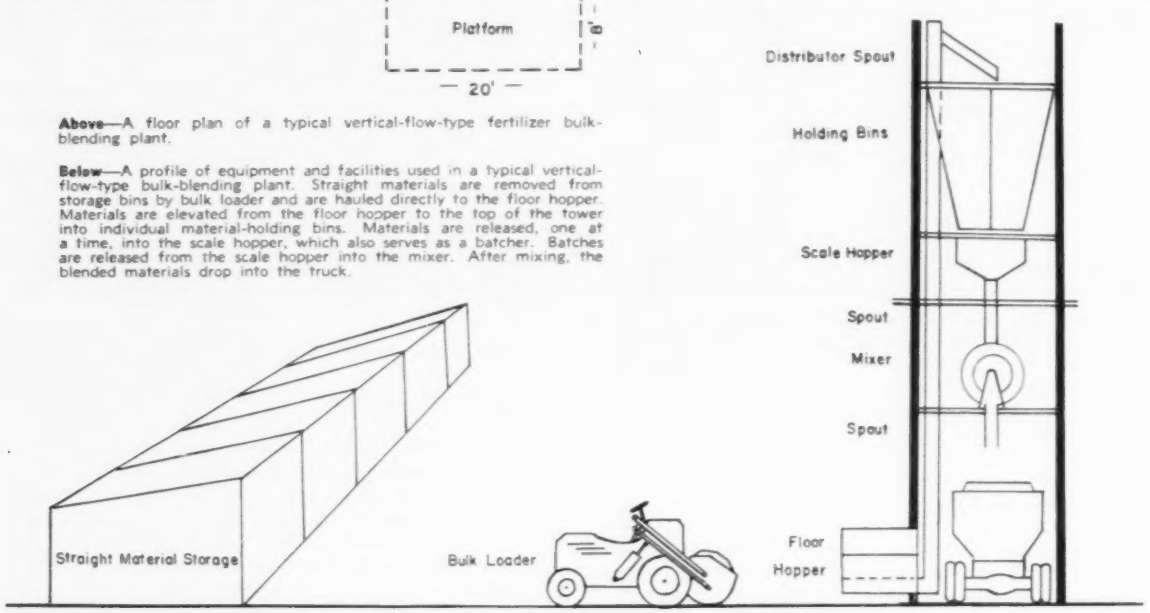
OPERATION 4 is the moving of materials from the scales to the mixer. In horizontal-type plants this takes about one-half minute per ton. In combined horizontal-vertical-type plants, materials are moved to the mixer either directly through the holding bin, taking 0.8 to 1.9 minutes, or the materials are moved to the holding bin, remain there temporarily and then fall into the mixer. Materials are moved from the scale to the holding bin in 0.8 to 1.9 minutes. It takes 0.4 to 0.5 minutes per ton for the batch to fall into the mixer. In vertical-flow plants this operation takes less than one-half minute per ton.

OPERATION 5 consists of mixing the raw materi-



Above—A floor plan of a typical vertical-flow-type fertilizer bulk-blending plant.

Below—A profile of equipment and facilities used in a typical vertical-flow-type bulk-blending plant. Straight materials are removed from storage bins by bulk loader and are hauled directly to the floor hopper. Materials are elevated from the floor hopper to the top of the tower into individual material-holding bins. Materials are released, one at a time, into the scale hopper, which also serves as a batcher. Batches are released from the scale hopper into the mixer. After mixing, the blended materials drop into the truck.



als. Mixing times do not depend on plant type, although horizontal-flow plants tend to have longer mixing times since operations cannot be performed simultaneously. Converted feed mixers run from 0.5 to 1.0 minutes per ton, while drum-type mixers usually run longer—1.5 to 2.0 minutes per ton.

OPERATION 6 consists of unloading the blended product from the mixer and moving it to the truck. Where the mixer is located above the floor level, gravity flow from the mixer into the truck takes 0.4 to 1.2 minutes per ton. When the mixer is unloaded by an inclined belt conveyor, it takes from 1.6 to 2.0 minutes per ton; by an elevator and enclosed auger, 2.5 to 3.0 minutes per ton; and by an elevator and belt conveyor, 1.8 to 2.4 minutes per ton.

When each operation in blending is completed consecutively (without overlap), it takes from 4.3 to 11.8 minutes to blend one ton of 10-10-10 equivalent.[1] Adding the operation times together does not indicate the output capabilities of any plant running continuously. Rather, the total potential outputs of the blending plants depend on how much equipment and labor flexibility is built into the plant. Equipment flexibility—the degree to which operations can be completed simultaneously simply because of the amount and arrangement of equipment—is usually available in all plant types, but primarily in combined horizontal-vertical and vertical.

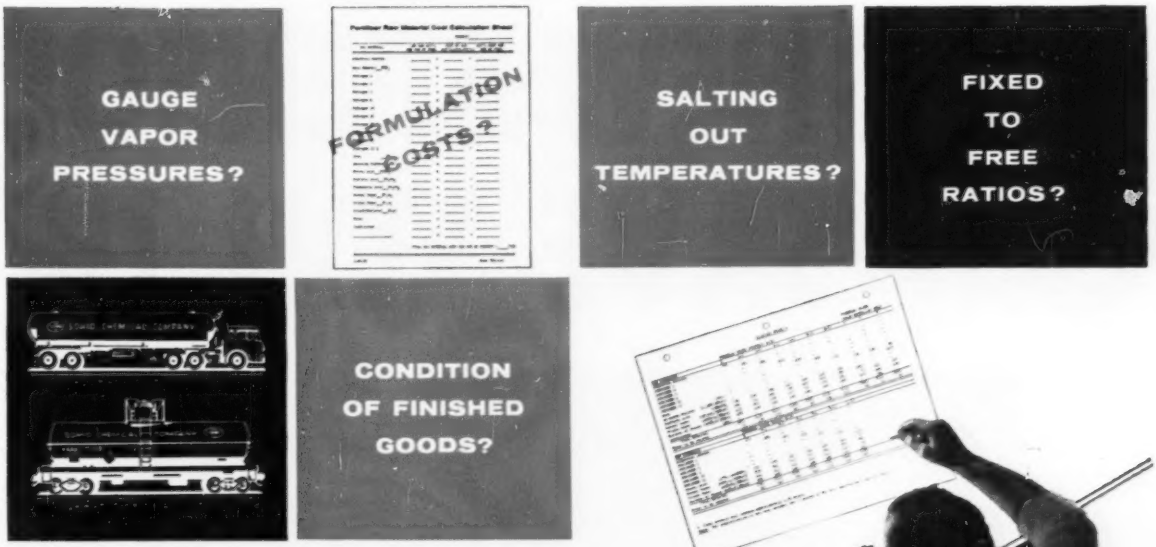
Operating Efficiency

In horizontal-type plants, while one batch is in the mixer, the bulk-loader operator can obtain one of the materials for the next batch and be ready to dump it into the mixer as soon as the mixer is empty. In vertical-type plants one batch can be weighed into the batcher, while another batch is being mixed and emptied into the truck. This means that the time to perform Operation 3 can be eliminated in the blending time per ton. In combined horizontal-vertical plants, the holding bin over the mixer adds equipment flexibility. The time needed to complete Operation 3 and the first part of Operation 4 is removed from the blending time per ton because of the holding bin.

Labor flexibility—or whether operations can be completed at the same time because they can be di-

[1] "10-10-10 equivalent" refers to a blend of straight fertilizer materials containing plant nutrients equivalent to the plant nutrients contained in a ton of conventionally mixed 10-10-10 analysis fertilizer.

When you add up the answers . . .



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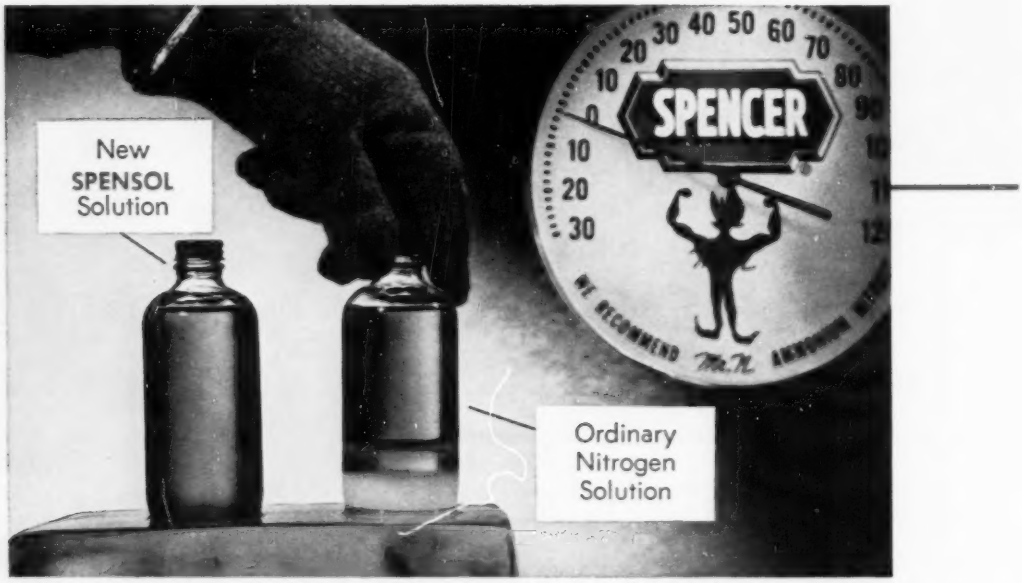

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	SPENSOL 430	YOUR PRESENT SOLUTION
Salting Out Temperature	14° F.	
% Total Nitrogen As Fixed Nitrogen	62%	
Ammonia	20%	
Ammonium Nitrate	68%	
Urea	6%	
Total Material	94%	
Water	6%	

	SPENSOL 440	YOUR PRESENT SOLUTION
Salting Out Temperature	−17° F.	
% Total Nitrogen As Fixed Nitrogen	59%	
Ammonia	22%	
Ammonium Nitrate	66%	
Urea	6%	
Total Material	94%	
Water	6%	

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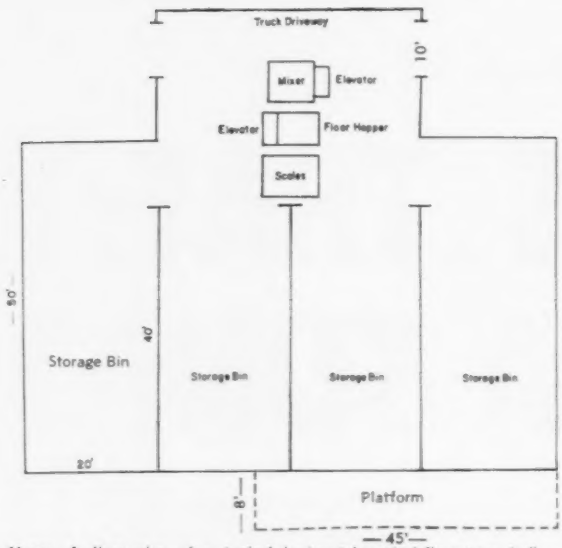
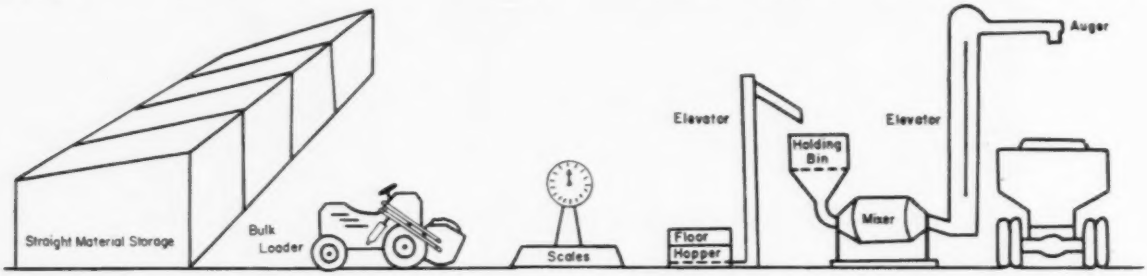


Above—A floor plan of a typical horizontal-vertical-flow type bulk-blending plant.
Below—A profile of equipment and facilities used in a typical horizontal-vertical-flow-type bulk-blending plant. Straight materials are removed from storage bins by bulk loader which is driven onto the platform scales for weighing. The bulk loader is then moved to the floor hopper into which the fertilizer material is dumped. Materials are elevated from the floor hopper into the holding bin, which also serves as a batcher. Batches from the holding bin are emptied into the mixer. After mixing, the blend is elevated and augered into the truck.



vided between two men—occurs to a limited extent in all plants. In horizontal-type plants, additional labor increases output per hour very little. A second man reduces the movements of the single operator, but rarely increases the simultaneous completion of operations enough to increase output significantly. In combined horizontal-vertical-type plants, a second man slightly increases the utilization of the holding bin, but not enough to increase output very much. However, in vertical-type plants the second man allows Operation 2 to be completed simultaneously with other operations —greatly increasing output per hour.

Table 3 indicates that horizontal-type plants have the lowest hourly outputs, vertical-type plants the highest, and combined horizontal-vertical-type plants have outputs that fall between the two when operation completion times are standardized between plant types. Only in vertical-type plants does a second man materially affect hourly outputs.

Table 3. Hourly Output Capabilities of Synthesized Blending Plants, Illinois, 1957.

Type of Plant	Potential hourly output (tons)		Percentage
	One Man	Two Men	Increase
Horizontal-type plant	10	11	10
Vertical-type plant	16	21	31
Combined horizontal-vertical-type plant	13	14	8

Output-Storage Relationship

A blending plant requires enough storage capacity so that operations will not have to stop while awaiting a supply of new materials. The amount of storage capacity needed varies with the demand for blended products. In Illinois, it normally takes a blending plant 5 to 10 days to order and receive ammonium sulfate, 8 to 10 days for triple superphosphate, and 8 to 9 days for muriate of potash. To be safe, at least 10 days should be allowed for ordering materials.

This means that a blending plant needs enough storage so that the ratio of daily output to tons of storage capacity is greater than the number of days required to obtain fertilizer materials. In Illinois, a ratio of 1:10 would seem adequate.

For instance, a plant with a daily output of 88 tons of 10-10-10 equivalent would need at least 756 tons of storage capacity during a period of high continuous blending demand.[1] A plant with a higher daily output of 168 equivalent tons of 10-10-10 would require at least 1,445 tons of storage capacity.

In studying Illinois plants, it was found that the output-storage ratio varied from a low of about 1:3 in some plants to a high of about 1:15 in other plants. Ratios below 1:10 would indicate that plants probably have more materials en route to them than they can store at any one time.

Scheduling Orders

Before the spring and fall fertilizer seasons, all blending plants send a tentative schedule of orders to their suppliers of raw materials. The tentative schedule stays effective throughout the season, but it can be changed very easily at any time up to the actual shipment date.

ONE METHOD—Plant managers tend to use two different scheduling methods. With one method managers try to always keep their bins full. This way they always have materials available for blending—risking adverse price changes on materials in order to reduce the risk of losing blended fertilizer sales because of empty storage bins.

ANOTHER METHOD—Other plant managers use an inventory control method of scheduling fertilizer material orders. They begin the season with full bins, but try to maintain only 50- to 60-percent capacity bin levels for the remainder of the season. This results in less chance of loss from price changes, but more chance of losing revenues because of inadequate supplies. Managers using this method must schedule orders much more accurately.

To increase accuracy in scheduling material orders, some managers maintain records of the daily volume of materials blended in past seasons and base the future season's scheduling on the past distribution of sales.

[1]Only 1,732 pounds of fertilizer materials are contained in a 10-10-10 equivalent ton. Storage capacity of blending plants is expresed in terms of 2,000-pound tons; therefore, to change the storage capacity to equivalent ton capacity, multiply by the factor 1.163.

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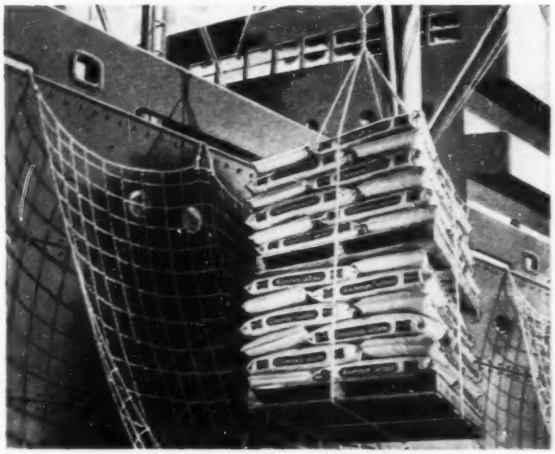

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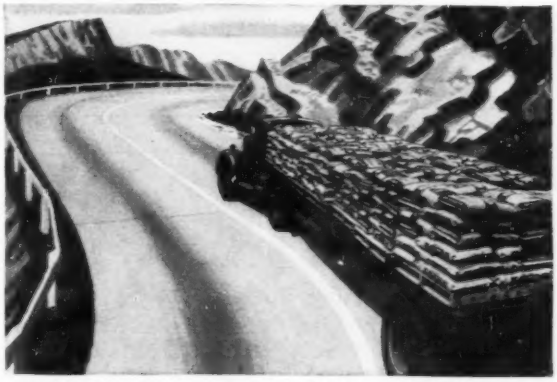

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ECONOMIC CONSIDERATIONS

Two Kinds of Costs

The costs of operating a bulk-blending plant that must be recovered before it pays are fixed and variable costs. Fixed costs occur because the facility exists and they remain constant or "fixed" in total regardless of whether or not the plant is used. Depreciation, interest on investment, property taxes, insurance, administrative labor, and rent are examples. Variable costs change in total with production. Straight fertilizer materials make up the principal variable costs. Others include operating labor, power, inventory losses, and repair and maintenance.

Cost and output data of the three types of plants observed in the field survey are presented in Table 4.

Table 4. Costs and Capabilities of Different Types of Illinois Fertilizer Bulk-Blending Plants Compared—1957[1]

	Types of Plant		
	Horizontal	Horizontal-Vertical	Vertical
Investment			
Equipment	$10,500	$22,200	$42,200
Building[2]	12,900	21,600	28,200
Land	1,500	1,500	1,500
Total	$24,900	$45,300	$71,900
Annual Fixed costs			
One man	$ 7,380	$10,500	$14,930
Two men	7,440	10,560	14,990
Variable costs (per ton)			
One man	$ 38.50	$ 38.35	$ 38.20
Two men	38.60	38.45	38.30
Potential daily volume			
One man	80 tons	105 tons	130 tons
Two men	90 tons	110 tons	170 tons
Potential 5-month volume			
One man	10,400 tons	13,600 tons	16,600 tons
Two men	11,400 tons	14,300 tons	21,800 tons
Break-even volumes			
One man	770 tons	1,100 tons	1,500 tons
Two men	780 tons	1,100 tons	1,500 tons
Days blending to break-even			
One man	10 days	10 days	12 days
Two men	9 days	10 days	9 days

[1]Costs and revenues are based on the blending of a 10-10-10 equivalent mixture using ammonium sulfate, concentrated superphosphate, and muriate of potash.
[2]Plant structures are assumed to be of high quality frame construction and to conform to plant layouts shown previously.

These data compare the cost and performance characteristics of each type of plant using items of equipment of equal capacity. Differences among the types of plants in additional pieces of equipment required, and over-all efficiency of operation, account for the variations in investment costs and plant output. Extra capital investments include additional conveyors, super-structures to obtain in-line flow through the various operations, additional holding bins, and the like. All of these permit timely and smooth transition from one step to another in the bulk-blending process. Insofar as possible, differences in labor capabilities have not been considered.

Weighing the economic advantage of one plant against another is not easy. Referring to Table 4, it is apparent that the horizontal-type plant achieves the most output per dollar invested. Also, with the lower investment the break-even volumes are lower relative to total potential outputs for the horizontal-type plants.

Vertical Plant Flexible

The vertical-type plant is quite flexible in expanding output if labor is added. Basic equipment in the vertical-type plant is utilized about 60 percent more effectively than in the less thoroughly engineered and less costly horizontal plant. Investing an additional $47,000 in the vertical-type plant creates a potential for 6,200 additional tons equivalent of blended material. Assuming a margin of $8 per ton on materials, and assuming further that the additional capacity of the vertical plant is utilized, the additional revenue received in one year would more than pay for the additional cost.

Another outstanding advantage of the vertical-type blending plant is the flexibility in output made possible by hiring an additional man. With this type of plant an addtional man can increase output 40 tons per day, whch allows the operator to increase daily income by at least $320. This large potential increase in capacity from hiring an additional man, in case the demand becomes unusually seasonal due to bad weather or for other reasons, is a valuable feature of the vertical-type plant.

Plant Output-Cost Data

Table 5 contains data collected from the field on three representative-type plants of similar capacity. Their total costs of operation per equivalent ton of the blend is reduced to a reasonable level by increasing output. With a revenue of $48.00 per equivalent ton, break-even tonnages for one-man operation were 770 tons for the horizontal-type, 1,000 tons for the combination-type, and 1,500 tons for the vertical-type fertilizer blending plant. Break-even times of operation using one man in these plants is 10 days, 10 days, and 12 days, respectively.

At maximum output, the cost of formulating each equivalent ton of blended mixture varied only a few cents among the three different types. Again, the main advantage of the more costly vertical-type plant is its ability to expand output by adding labor. It appears to fit well into a large market area having good potential for expanding sales.

Table 5. Cost-Volume Relationships for Selected Illinois Blending Plants, 1957[1]

Annual plant output	Total Cost per Ton of Equivalent Mixture		
	Horizontal-Flow plants[2]	Horizontal-Vertical-Flow plants[3]	Vertical-Flow plants[4]
(Tons)	(Dollars)		
100	110.00	149.00	203.00
500	54.50	60.50	71.00
1,000	46.50	49.50	54.70
5,000	40.00	40.60	41.50
10,000	39.25	39.45	39.90
12,500	39.10	39.25	39.55

[1]Blending 10-10-10 equivalent with the operator only.
[2]Average variable costs per ton amounted to $38.50.
[3]Average variable costs per ton amounted to $38.25.
[4]Average variable costs per ton amounted to $38.20.

Spreader Truck Costs

Trucks for spreading, including a spreader bed with a belt feed and two spreader fans, cost about $6,500. These trucks are usually depreciated over a five-year period. Depreciation and other fixed charges were determined to be $1,640 annually. Variable costs, which include what are usually termed operating costs, are about as indicated in Table 6. As would be expected, the larger the tonnage hauled—up to 7 tons, the legal limit—the lower the operating cost per ton of materials spread. Also, the greater the distance to the spreading site, the higher the operating cost per ton.

Table 6. Variable Cost per Ton to Operate Spreader Trucks[1]

Tons Hauled	Miles						
	3	5	10	15	20	25	30
2	$2.09	$2.29	$2.78	$3.28	$3.77	$4.27	$4.75
3	1.99	2.13	2.47	2.82	3.16	3.51	3.85
4	1.94	2.05	2.31	2.58	2.85	3.12	3.38
5	1.91	2.00	2.83	2.45	2.67	2.90	3.12
6	1.89	1.97	2.16	2.35	2.54	2.74	2.93
7	1.88	1.85	2.12	2.29	2.47	2.64	2.81

[1]The spreading rate is assumed to be 300 pounds of blended material per acre. Labor costs have been charged at $1.35 per hour and gasoline at 30 cents per gallon.
Source: Agricultural Experiment Station Special Bulletin 408, Michigan State University.

Revenue—Where It Comes From

The income bulk blenders received from their operations came from three sources: retail sales of materials in the blends, blending charges, and spreading charges. The eight blending plants studied averaged about $8.00 as the margin between purchase price and selling price on blended fertilizer materials, and $2.85 was the average charged for blending. Thus, a total of almost $11.00 per ton of equivalent 10-10-10 was available for paying the fixed and operating costs of the plant.

Revenue from spreading varied considerably from plant to plant. The many specific charges for spreading are listed in Table 7. Charges averaged about $1.15 for spreading 300 pounds of the 10-10-10 equivalent material per acre.

Table 7. Spreading Charges Made by Selected Illinois Fertilizer Bulk-Blending Plants, 1957[1]

Number of plants	Method of charging for spreading	Charge for spreading 300 lb. 10-10-10 equiv. per acre
4	$1 per acre with no limitations on quantity applied	$1.00
2	$1.25 per acre with no limitations on quantity applied	1.25
3	$1.25 per acre for less than 700 pounds applied ($3.25 per ton for over 700 pounds applied per acre)	1.25
1	$1.50 per acre with no limitation on quantity applied	1.50
1	$1 per acre on unplowed ground with no limitation on quantity applied	1.00
	$1.25 per acre on plowed ground with no limitations on quantity applied	1.25
1	$1.25 per acre for less than 300 pounds applied ($1.50 per acre for more than 300 pounds applied)	1.25
1	$1 per acre for less than 400 pounds ($1.25 per acre for 400 to 600 pounds; $3.60 per ton for more than 600 pounds applied per acre)	1.00
13	Average approximately	1.16

[1]These data were collected during a preliminary survey of bulk-blending facilities in Illinois during the first half of 1957.

That $1.15 per acre charge for spreading returns about $7.75 per ton of material. This markedly exceeds the variable costs indicated in Table 5 and leaves several dollars per ton to cover the fixed annual cost of $1,640. The spreading trucks are also versatile—like much of the bulk-blending plant equipment. They can be used for hauling and spreading lime and sand, and for hauling soil on excavation jobs. Therefore, some of those fixed costs probably can be spread to other enterprises during those seasons of the year when the trucks are not used much for spreading bulk-blended material.

SPECIAL CONSIDERATIONS

Custom Spreading Service

Operating spreading trucks offers two possible sources of income to the blending plant owner: (1) income from the spreading charge—previously discussed, and (2) increased income from the blending operation over an expanded market area.

With existing margins between the costs and selling prices of fertilizer straight material, increased blending volume usually means increased profit possibilities. Once the area close around the plant has been satura with sales, only by expanding the sales circle around e plant can fertilizer sales be increased.

Operating spreader trucks over an extended market area usually boosts truck costs and cuts into revenue from the spreading operation. However, reduced income from the spreading operation by increasing the market area means increased income from the sale of blends. The fact is, in some cases firms can operate their spreader trucks at a net loss if they can materially increase their blending volume.

An Aid to Farmers

Farmers are using the spreading service offered by blenders to cut down on their labor needs during peak working months. A farmer can buy blended fertilizer and hire it spread on his soil with a spreader truck for about the same cost as unspread, conventionally mixed, bagged fertilizer. This way, he saves the cost of hauling and spreading the fertilizer himself; also the demand on his labor is reduced.

Seasonality of Operation

Two periods of the year are important to bulk blenders, the spring and the fall. In its first 3 years of operations, one blending plant had a sales distribution in which 63 percent of its 3-year volume occurred in March, April, and May, while 31 percent of its volume was in September and October. Therefore, 94 percent—or almost the entire blending volume—was distributed during a 5-month period.

Stretching Out Spreading Season

During the summer months, crops cover the soil so that fertilization by spreader trucks is impractical. During the winter months, weather hinders expansion of fertilizer sales, because the ground is too wet to support the spreader trucks much of the time. Some blending firms are trying to increase sales during the winter by stressing the ability of spreader trucks to operate while the ground is frozen.

Additional Services Possible

Bulk-blending offers the opportunity for integrating the various activities of furnishing agronomic advice to farmers, promoting soil testing, providing prescription mixes according to soil test analysis, and custom spreading into a well-organized fertilizer program for farmers. A fertilizer bulk-blending enterprise provides a firm an excellent opportunity to expand the volume of its fertilizer business sufficiently to warrant providing the adjunct services. As a result, firms offering these types of services in connection with their bulk-blending business have had excellent success in increasing their volume through greater farmer acceptance.

EDITOR'S NOTE

Authors Bond and Walkup point out in the foregoing article that following the findings as presented here is no guarantee of success in a bulk blending operation. They do not point out some of bulk blending's disadvantages nor emphasize that such an operation would not be permissible or profitable in many areas. As one manufacturer (whose experience in the fertilizer industry is long and varied) says, "bulk blending to be truly effective would require facilities close to the point of using throughout the area you are serving . . . also weather conditions impose unexpected hazards." Further, opponents of bulk blending point out, processing generally must be done at the time of shipment which prevents the plant operator from "spreading" his season and having goods already processed and ready to ship at peak demand. In addition, they claim that goods lose identity in a bulk state, and the door may be left open to unscrupulous practitioners in regard to specifications of materials and delivered weights. However, this article will give many CF readers a clearer picture of the bulk blending operation—a factor to be reckoned with in the industry's future.

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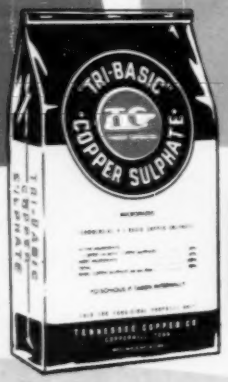

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CALIFORNIA

Hercules Powder Co. early last month announced commercial production at its new plant at Hercules, which has a urea capacity of 20,000 annual tons. Three quarters of the urea will be for agricultural use, according to **R. W. Crabtree,** manager of chemical sales for the Hercules explosives department, which operates the plant. Officials stated that a new process produces an unusually high quality urea.

This quality, an unusual purity, the Hercules people tell us, makes it practical for direct foliar application, though the principal end use will be in UN-32, which contains 35% urea and 45% ammonium nitrate. UN-32 is compatible with herbicides such as 2-4-D, accelerates decomposition of crop residues and compost. has no pressure and no volatile ammonia.

California Ammonia last month conducted a tour of its new $5,000,000 plant at Lathrop, for a group of its farmer shareholders, and told them the facility would be in operation by the end of this year. Chairman **Lowell W. Berry** also stated that plant construction costs were running some 16% below original estimates, or at the rate of $125 per annual ton of capacity.

FLORIDA

Citrus Culture Corp. officials are well along in plans to rebuild on the ashes of their more than $300,000 facility at Mt. Dora, consumed by fire in September, except for shop and warehouse. Rolling equipment also saved enabled them to continue deliveries from the warehouse. The destroyed plant had just completed a $90,000 modernization program, but president **J. E. Fortner** and his associates have been touring other citrus fertilizer plants with the view of making the new plant as modern as possible, even more so than the "push button" plant it replaces.

GEORGIA

Zebulon Ginning & Fertilizer, Zebulon, has been sold to **R. F. Strickland Co.** of Concord, which plans to continue operation, with **George M. Strickland, Jr.** in charge. The concern was organized in 1911.

IDAHO

Central Farmers Fertilizer is in production of phosphate ore at Georgetown Canyon, which will serve their multi-million dollar elemental furnace complex still under construction at Phosphoria Gulch. A 2-mile long, 36 inch, conveyor system delivers an hourly 400 tons of the ore, which will be stockpiled to the extent of 250,000 to 300,000 tons on the downhill side of the conveyor, according to **A. L. Stutts,** general manager of the works. Switching mechanism will permit workers to drop the ore in graded piles.

The conveyor, built and installed by **Western Conveyor Co.,** Boise, generates the electricity which controls its speed through braking systems, and is a supplemental source of power in the phosphate reduction area. Open pit mining can be conducted in the Georgetown Canyon the greater part of the year.

KENTUCKY

Ohio Valley Fertilizer Inc. has been incorporated for $100,000 at Maysville by **Herbert Moore, Gilbert R. Noe** and **Albert G. Clay.**

MISSISSIPPI

Dixie Fertilizer Co., whose chartering we reported here last month, is planning for Meridian a $1,000,000 plant to produce fertilizer from activated sludge from Meridian's new sewage treatment plant, the sludge being about 30% of the ingredients. President **J. A. Hill** says the plant will be one of the largest of its kind in the U. S. with a capacity of 120,000 annual tons of finished product.

NORTH CAROLINA

Farmers Cooperative Exchange directors approved an addition to their Lumberton fertilizer plant to cost about $40,000. It includes an additional mixing and bagging unit. At the same meeting officers and the Raleigh administrative staff were re-elected: **Fred A. Cochrane,** president; **Lambert Lewis** and **C. B. Player,** vice-presidents. Heading the administrative staff is **G. D. Arndt,** general manager and secretary-treasurer.

Davison Chemical are permanently closing their branch at Wilmington.

TENNESSEE

Hooker Chemical expects to have in operation by April expanded facili-

CLOISONNE VASE being presented here to Thomas M. Ware (right), president of International Minerals & Chemical Corporation, is house-warming gift from Mitsubishi Shoji Kaisha, Ltd., of Tokyo, on occasion of the formal opening of IMC's new Administrative and Research Center in Skokie, Ill., suburban Chicago. B. Tannabe, president of Mitsubishi International, flew from New York to make the formal presentation for the Tokyo firm, an important customer of IMC's Phosphate Minerals Division.

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ties now going into their plant at Columbia. This will substantially increase their dicalcium phosphate production at that plant, which operates two electric furnaces on phosphate rock from their own reserves.

WASHINGTON

California Spray-Chemical will build at Kennewick a $4,600,000 fertilizer plant we are told by its president, **A. W. Mohr.** Engineering work has already begun and the plant is scheduled for completion by the end of next year.

In making the announcement, Mr. Mohr stated that the plant will manufacture ammonium nitrate, ammonium nitrate solutions and high analysis nitric phosphate complex plant foods to meet the growing demand of agriculture in the Pacific Northwest and Rocky Mountain states. Calspray has been supplying these materials from their Richmond, California plant, which was completed in 1956.

"The vigorous growth of Northwestern agriculture in recent years, the success achieved by nitric phosphate plant foods in meeting the diversified requirements of crops and soils in the area, and the established Ortho service and distribution facilities are the main factors behind the Company's decision to expand in this direction," Mr. Mohr said.

This will be the fourth Calspray plant established in Washington State. Insecticide plants have been in operation in Yakima and Wenatchee for over 10 years. Calspray's formulation plant in the city of Seattle went into operation in 1955. The new fertilizer plant in the Tri-Cities area will be centrally located with excellent transportation facilities for servicing farmers throughout the Northwest and Rocky Mountain area.

It is expected that the new plant will locate near the existing chemical plants east of Kennewick.

ASSAM

The Government has asked that a fertilizer plant be added to the small refinery being planned, to use the refinery gases. Location and details are in discussion.

AUSTRALIA

Mt. Morgan Ltd. proposes a plant capable of 100,000 annual long tons of ammonium sulfate, to cost about $15,200,000. Mt. Morgan proposes to supply some capital, but hopes Americans interested in nitrogenous fertilizer investment will come forward. The area around Mt. Morgan is said to contain some 10,000,000 long tons of pyrites, of which 3,500,000 are on the property of the concern. All raw materials, power, coal and good transportation facilities are available, they report.

BRAZIL

Brazil Nitrogen and **Japan Plant Association** are completing plans for the first of $100,000,000 worth of joint Japanese-Brazilian ventures. The first plant, to cost some $13,000,000 is to be built at Aratuhipe, in Bahia Province. Japan, under current proposals, would supply 45% of the capital in the form of machinery.

Tentative plans are for an operation, using natural gas, capable of daily outputs of 20 tons of ammonia, 180 of lime, 150 of urea.

CANADA

Western Gypsum, Calgary, have bought the $350,000 **Columbia Gypsum** plant at Greenacres, Washington, and will move the equipment to their plants at Calgary and Vancouver. The plant, built in 1951 by **Columbia Gypsum** of Spokane was sold in 1954 to **Columbia Gypsum** of Vancouver. Western Gypsum is a subsidiary of British Plasterboard.

KOREA

Choongjoo Fertilizer Plant, which is 80% completed, is being pushed toward June start-up by the Combined Economic Board. The Board in the same meeting approved a $400,000 nitric acid plant, but deferred action on a $450,000 fused phosphate fertilizer plant.

Choongjoo is costing $33,300,000 in American aid money, plus matching funds of 2,700,000,000 hwan. It is expected to produce 85,000 annual tons of urea, and cut Korea's nitrogenous fertilizer import needs by $12,000,000 a year.

McGraw-Hydro Carbon has the construction contract. A U.S. Chemical concern will be retained to arrange a program of managerial advisory services, and to supervise training of personnel and operation until a Korean staff is ready to take over.

Three more such plants would be required to eliminate Korea's imports of nitrogenous fertilizers.

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PEOPLE in the Industry

Hooker Chemical

Harold E. Frederick has been made Phosphorus division sales-manager for crop chemicals, with Errol F. Cook responsible for technical service of the same unit. Both were with Shea prior to its merger with Hooker last May.

Calspray

California Spray Chemical has appointed two to newly created posts of regional manager: George W. Oliver to the Northeast; Earl J. Stripling, Jr. to the Southeast; Charles Lupsha has been made district manager and Malcolm P. McCarty a representative for New England; Virgil P. Hennen has been made manager of the Yuma, Ariz. branch. The latter will work out of Hudson, Mass. Mr. Oliver has been with Calspray 22 years; Mr. Stripling, nine years; Mr. Lupsha has been with them in marketing posts for some years; Mr. McCarty comes direct from National Agricultural College.

NPFI

Esper K. Chandler, assistant professor of agronomy research at the Louisiana State University's North Louisiana Hill Farm Experiment Station, has been named district representative of the National Plant Food Institute for the Southeastern regional office at Atlanta, Ga., Dr. Russell Coleman, Executive Vice President of the Institute, announced.

Chandler

Mr. Chandler received his Bachelor of Science degree in general agriculture and rural sociology in 1948 from Louisiana State University and his Master of Science degree in soils from the University in 1955. As district representative, he will be under the supervision of Dr. Samuel L. Tisdale, Southeastern Regional Director for the Institute.

Edward R. Schumann became a district representative of the National Plant Food Institute, with offices at St. Paul, Minn., effective Oct. 1, Dr. Russell Coleman, executive vice president of the Institute, has announced.

Schumann

A graduate of the University of Illinois College of Agriculture where he received his Bachelor of Science degree in 1954 and his Master of Science degree in Agronomy in 1956, Mr. Schumann will work in the states of Minnesota, North Dakota, South Dakota and Wisconsin. He will report to Zenas H. Beers, Midwest Regional Director of the Institute, whose offices are in Chicago, Ill.

Grace Chemical

Grace Chemical Division of W. R. Grace & Co., has announced the promotion of Joseph W. Floyd to the position of Memphis district sales manager replacing C. J. Bown who has resigned.

Slusher

Floyd

Lee J. Slusher will assume the responsibilities previously held by Mr. Floyd, as Southeastern district sales manager with headquarters in Tampa, Florida.

CIL

William E. Plummer has been appointed works manager of the fertilizer plant of Canadian Industries Limited at Chatham, Ontario. He replaces Murray Smith who, after 32 years service with the company, has retired on pension. He joined C-I-L in 1947 as a supervisor in the company's fertilizer plant at Hamilton where he became production superintendent in 1956. He was transferred to the Chatham plant as assistant works manager in June 1958.

Plummer

Potash Co. of America

Potash Company of America announces the appointment of Dennis Robertson as sales representative for Florida. He will work in conjunction with Paul C. Ausley, Orlando, and will be under the general supervision of W. H. Appleton, Southern sales manager. Mr. Robertson will make his headquarters in Atlanta.

Robertson

Virginia-Carolina

William H. Wilson has resigned as president of Virginia-Carolina Chemical Corp., leaving Justin Potter, board chairman and largest stockkholder, in complete executive charge, as president.

Mr. Wilson, at Mr. Potter's request, will remain a consultant to and director of V-C. Mr. Wilson said, however, he does not plan to remain full-time with the firm and has no definite plans.

Besides Mr. Potter's election as president, there were other changes: R. Clifton Long, advertising and public relations director, was elected secretary and Amos M. Schuster, a vice president, was named treasurer. They will split the duties formerly handled by Richard McConnell, who is resigning to handle family financial affairs in Florida. R. Daniel Smith and Curtis B. Alderman were elected assistant secretaries and Wallace T. McKeel was chosen assistant treasurer.

James G. Jackson has been appointed sales manager of the Chase Bag Company St. Louis branch, it was announced in New York by W. N. Brock, vice president and general sales manager. The sales territory served by the branch includes portions of Missouri, Iowa, Illinois, Indiana, Kentucky, Tennessee and Arkansas.

Jackson

Commercial Solvents

Commercial Solvents Corporation has named Frank B. Clayton to its expanding agricultural chemicals sales staff, according to C. T. Marshall. sales manager for CSC's agricultural chemicals department. Mr. Clayton is assigned to the Company's Kansas City District Office, Kansas City, Missouri, and his territory will include Kansas and Nebraska.

Louis L. Funk has been named to the Midwest, where his sales responsibilities will be in Indiana, Michigan and Northern Ohio. His headquarters will be at the Company's Cincinnati District Office.

Funk

Westavco

West Virginia Pulp and Paper Company has named ten to new positions in the Southern region of its Multiwall Bag Division as a means of handling a rapidly growing volume of business, it was announced by Jason M. Elsas, regional manager.

Atlanta district: Henry M. Howe, district sales manager; Samuel O. Wilkes and Ernest E. Lockett as sales representatives under Mr. Howe, with H. Lockwood Frizzell, who has been with the Atlanta office.

Dallas sales district: Eugene O. Wilson, sales representative for the Dallas area, reporting to Stanley P. Herd, district sales manager. The Dallas District has two other sales representatives, James A. Schoenstein and H. Dent Laney.

Torrance, Calif., district: Frank L. Smith, district sales manager. Sales representatives on Mr. Smith's sales staff include Mark N. Thomson, J. Edward Addicott, William P. Gatts, Richard P. Allen and William M. Ritchie.

Technical Service staff for the New Orleans and Los Angeles areas: Eugene C. Bristol for New Orleans, Dallas and Atlanta districts. Robert J. Gigler for the West Coast area.

The division's customer service has been placed under operations, directed by Peter H. Walmsley:

William H. Richmond, customer service manager at the Torrance plant.

At New Orleans the customer service manager is P. C. Impastato, assisted by Joseph A. Hart.

The Denver office has been shifted to the jurisdiction of the Torrance District. W. M. Ritchie, who has been working out of Denver, will continue to operate out of that office, but will report to Torrance.

Mr. Elsas, regional manager with headquarters in New Orleans, has field responsibility and over-all direction of the plants at New Orleans and Torrance. Sheldon Y. Carnes is regional manager of the bag plants at Wellsburg, W. Va., and St. Louis, Mo., with headquarters in New York.

John O. Frahm has become district sales manager of the Chicago area effective Oct. 1, it was announced by Tom L. Jones, regional sales manager.

Mr. Frahm's headquarters will be in Chicago. He will cover the metropolitan area of Chicago, most of northern Illinois and the Milwaukee area of Wisconsin.

Davison Chemical

Appointment of Page Edmunds as assistant general manager of chemicals in the W. R. Grace & Co., Davison Chemical Division is announced by R. D. Goodall, vice-president and general manager of chemicals. Concurrently, Mr. Edmunds has been named vice-president of Davison Chemical Company Ltd., the Canadian affiliate of the division.

Edmunds

Expansion in personnel and realignment of sales territories for Davison triple superphosphate are announced by William Caspari, Jr., general sales manager, agricultural chemicals, W. R. Grace & Co. Davison Chemical division.

George Klein has been assigned the central territory east of the Missippi, from Tennessee to Wisconsin; Basil Wagner operates in North and South Dakota, Nebraska, Iowa and Wisconsin; C. K. Brutcher covers the southwest, and J. G. Carroll the eastern territories. All men are veterans of the Davison organization.

Stauffer

Robert M. Peters has been appointed plant manager of Stauffer Chemical Company's agricultural plant at Bayonne, New Jersey. He was formerly manager of the company's agricultural chemicals plant at Houston, Texas.

George A. Cox Jr. has been appointed manager of their Houston, Texas plant. He has been manager of the company's agricultural chemicals plant at Harvey, Louisiana.

Thomas M. Byrn, formerly assistant manager of the Harvey plant, has been promoted to plant manager.

Retzloff Chemical

Retzloff Chemical Company, Almeda, Texas has announced the appointment of Servando Trevino as international sales and technical service representative for Mexico. He will make his residence in Mexico City where the offices of Quimica Retzloff, S. A. are located.

Munson

T. Alan Powell has been named sales manager for Munson Mill Machinery Company, Utica, N. Y. He will be in charge of equipment sales to the industrial, chemical and feed milling fields. Mr. Powell joined Munson in 1936.

African Explosives & Chemical

Guy Erskine Hughes, CMG, who was managing director of Imperial Chemical Industries, in South Africa, has been made managing director of African Explosives and Chemical Industries. He has a distinguished record from wartime, and as an administrator for postwar adjustments.

VC

The Virginia Carolina Chemical Corp. has presented 26 service awards to employes of its Charleston plant. The awards represented a total of 430 years of service with the company.

The top award went to L. B. Byers for 40 years of service. Others receiving awards were James Faley, 35 years; John Chaplin, 35 years; Richard Collins, 30 years; Johnnie Stanfield, 30; Amos Jenkins, 25 years; M. C. Clemens, 20 years; Annie Brown, Charles Frazier, Sam Grant and Janie McDuffie, fifteen years each.

Ten year awards were made to Billy Gadsden, Herbert Hammond, Peter Rivers, Fred Seward Jr., George Shaw, Jerrold W. Beach, Woodrow W. Blizzard, Harden Bradford, Dennis C. Holliday, Joseph McCall Jr., Corde H. Meiburg, Sanders Scott, William Singletary, Joe Washington, and Claude Williams.

Gold pins are awarded for the first ten years of service. For each five years of service, thereafter, jewels are added to the pins.

Hah! More Competition!

A big stove manufacturer, offering an incinerator for home disposal, says "The only product of combustion is a fine ash, useful as a fertilizer."

IM&C Scholarships Put 38 In College

International Minerals & Chemical Corporation announced that 38 young men and women are enrolled in U. S. colleges and univ rsities this fall under the Company's scholarship program.

Since the inception of the program in 1947, International has awarded 98 scholarships to high school graduates, 26 of whom have completed four-year college courses with degrees. Four-year scholarships have gone to 70 students, while 28 received special, one-year awards.

All awards are made on the basis of scholastic performance, character, leadership ability, and relative financial need. Winners are determined by scholarship committees made up of prominent educators, business and industrial leaders, and local managers of IMC installations.

Scholarship winners are not obligated to the Company in accepting the benefits

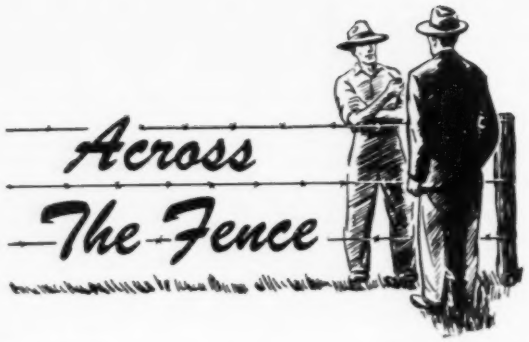
Nitrogen Division Process Eliminates Dry Nitrogen

Nitrogen Division, Allied Chemical Corp., has developed a new process that will enable fertilizer manufacturers to make high-nitrogen mixed goods without the use of dry nitrogen materials. Using only nitrogen solutions, manufacturers will be able to make mixed fertilizers with a nitrogen content as high as 16%.

The new ammoniation technique, developed at Nitrogen Division's central research facilities in Hopewell, Va., involves the use of sulphuric acid with selected Nitrana nitrogen solutions. The process, which is continuous, can be used by fertilizer manufacturers who have granulating equipment. A certain amount of new equipment, plus modifications of standard ammoniating apparatus, are necessary, the Division explained.

Nitrogen Division is offering the process to fertilizer manufacturers at no cost. Operating techniques, with guides as to type of solution, strength of acid, temperatures and other factors, have been worked out, the Division said. Nitrogen Division technical service men are available to assist with design and operation.

Several fertilizer manufacturers are planning to install equipment for the new process, the Division announced, and will produce such grades as 14-7-7, 16-8-8, 14-0-14 and 15-10-10.



research facts to help you sell

Bank Credit is not a thing to fear, says the California Fertilizer Association in a recent bulletin. It should, instead be considered as a means to better farm income, when wisely used, of course. And they consider it so important that it will be a featured subject at their convention this month.

* * *

Farms grow and, like industrial plants, become more and more efficient as they get larger. Dr. John Brewster of USDA made a talk on this subject in Winnepeg, before the American Farm Economics Conference.

In the old days, he said the average family could not say grace over more than 100 to 160 acres. Today, with modern equipment a family can handle ten times that much active acreage . . . in fact unless they do farm big acreage, the farm family of today cannot hope for enough income to live up to modern standards.

The vanishing of the little, rundown farm is ample proof of this.

* * *

Record farmland value is announced by USDA. In the period ending July 1 farmlands showed a 5% rise from a year earlier, and reached a record high. Active farmers bought 60% of this land, but a steady demand from urban buyers has contributed to pushing up the price. Other factors are better crop and income prospects, inflationary pressures and the like.

More tomatoes per acre cost no more to handle, and bring in better cash, says Professor Charles B. Sayre of Cornell. Regardless of how many plants you put down per acre, the land costs the same, fertilizer spraying, equipment, interest etc. all remain pretty much the same. And, he says, that's true whether you plant 3000 or 6000 plants per acre.

* * *

A disc-type fertilizer applicator has been developed by agricultural engineers of the Oklahoma AES, which they say helps to give thicker and more uniform stands, without increase in the seeding rate, possible yield increases and plants better suited to mechanical harvesting.

* * *

Moisture test: USDA is experimenting with a device which sticks two small prongs in the stem of a plant. These lead to an ohm-meter which measures the resistance between prongs . . . the more water the less resistance. The more resistance the more the plant needs moisture. QED.

St. Regis KC Expansion Complete

St. Regis Paper Company announces that it has completed the expansion and modernization of its multiwall bag plant at Kansas City, Missouri.

The Kansas City plant was opened in June, 1956, equipped only to manufacture sewn multiwall bags. Now with its newly-installed stepped-end bag machine and expanded engraving, printing, sewing and shipping departments, it is equipped to manufacture pasted open mouth and valve bags as well as the new stepped-end bags.

U. S. Patents Assigned To Hooker

Two United States Patents just issued have been assigned to Hooker Chemical Corporation, Niagara Falls, N. Y. Patent 2,851,476 for "Process of Making Phosphates," was issued to Dr. Ingenuin Hechenbleikner of Clarksburg, Mass.

Patent 2,853,508, for "Diphenyl Phosphite," was issued jointly to Dr. Hechenbleikner and Herbert W. Sloan of Lee, Mass.

Both men are employed in the company's Phosphorus Division research laboratories located at Adams, Mass.

NOW...ONE MIDWESTERN SOURCE FOR THREE BASIC FERTILIZER MATERIALS

With the addition of a phosphatic solution plant to its chemical complex at Tuscola, Illinois, U.S.I. can now supply a large area in the Midwest with a variety of fertilizer materials that will meet all your needs for these components:

PHOSPHORUS . . . in the form of Phosphatic Fertilizer Solution (wet process phosphoric acid, 54-55% P_2O_5). This is available from U.S.I.'s new plant which produces 30,000 tons/year of P_2O_5. This chemical frequently enables you to make your regular and special granular grades of fertilizer at lower cost . . . and to make higher analysis grades.

NITROGEN . . . available as anhydrous or aqua ammonia, plus 16 types of nitrogen solutions including urea types.

SULFURIC ACID . . . available in all concentrations including oleum, plus good spent acid of fertilizer quality. Plants, not only in Tuscola, but also in Sunflower, Kansas, and Dubuque, Iowa.

To help you make the most of these various products, U.S.I. Technical Service people are ready to work with you. The U.S.I. Engineer will help you trouble shoot, set up formulations, work with you on experimental runs, consult with you on equipment selection, and can also offer U.S.I.'s laboratory facilities for more intensive investigations.

For products or assistance from U.S.I. Technical Service Department, write Heavy Chemicals Sales.

U.S.I INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.
Branches in principal cities

Fertilizer dealers named to customer advisory board organized by Phosphate Minerals and Marketing Divisions of International Minerals & Chemical Corporation to expand IMC services to farmers and dealers, were welcomed at recent meeting in Company's new Administration and Research Center, Skokie, Illinois, suburban Chicago.
Group included (left-right, standing) S. T. Keel, sales manager, phosphate minerals; J. L. Mealy, sales manager, rock phosphate; F. A. Koechlein, general manager, phosphate minerals; A. E. Cascino, vice president, marketing; N. G. Schenet, manager, sales services; James Prather, dealer and board member, Tarkio, Mo.; William Parrish, dealer and board member, Auburn, Ill.; and H. R. Haiden, assistant sales manager, rock phosphate.
Seated are Hugh Graham, dealer and board member, Trenton, Mo.; G. W. Movers, IMC vice president, phosphate minerals; and three dealer-members of the group: Lewis Flohr, Urbana, Ind.; William Edwards, Pontiac, Ill.; and Rome Schwagel, Sharpsburg, Md.

Southwest Accident Prevention School

The Southwest accident prevention school for fertilizer plant supervisory personnel will be held at the Sheraton-Terrace Motor Hotel, Austin, Texas, November 13 and 14, Paul T. Truitt, executive vice president of the National Plant Food Institute, has announced.

The two-day school is sponsored by the Fertilizer Section of the National Safety Council and the Institute.

Director for Instruction is Glenn C. Peterson, Instructor in Supervision for the University of Kansas Extension and the Kansas State Board for Vocational Education. A. I. Raney, Safety Director, Phillips Chemical Company and a member of the Fertilizer Section of the National Safety Council, is in charge of the school.

Speakers and the topics for the school in the Southwest are:

Thursday, Nov. 13—8:30-9:00 a.m., registration; 9:00-9:20, welcome and introductions, A. I. Raney, Safety Director, Phillips Chemical Co., and George F. Dietz, Chairman, Fertilizer Section, National Safety Council; 9:20-10:00, Opening of Work Course under direction of G. C. Peterson, University of Kansas Extension, "Safety: Principles of Management and Human Relations,"—a complete summary of this and all other topics will be given in a SAFETY MANUAL which all enrollees will receive and use through the work course. Films, slides, and other visual aids will be used throughout the course; 10:00-10:15, coffee in the Conference Room; 10:15-11:00, "The Supervisor's Responsibility for the Safety and Health of his People," G. C. Peterson; 11:00-11:45, "Selling Safety—It Hurts to Get Hurt," G. C. Peterson; Noon, group luncheon; 12:45-1:15 p.m., "The Importance of Good Job Instruction," John Gallagher, Staff Representative, Fertilizer Section, National Safety Council; 1:15-3:00 "How to Teach Safety—Training in Safe Work Habits," G. C. Peterson; 3:00-3:15, coffee and Cokes in Conference Room; 3:15-4:00, "Planning Safety Meetings," G. C. Peterson; 4:00, Questions and Announcements.

Friday, Nov. 14—9:00-10:00 a.m., "Conducting Safety Meetings," G. C. Peterson; 10:00-10:15, Coffee in Conference Room; 10:15-11:45 "Putting the Thoughts Together," G. C. Peterson; Noon, group luncheon; 12:45-1:15 p.m., "Maintaining Good Order for Safety," W. C. Creel, Safety Director, North Carolina Department of Labor; 1:15-3:00, "Practice in the Use of Accident Prevention Tools," G. C. Peterson; 3:00, Questions, final remarks, and adjourn.

For information on room reservations and fees write to Dr. Robert L. Beacher, Southwestern Regional Director National Plant Food Institute, Route 8, Township Road, Fayetteville, Arkansas.

Dixon-IPT Brings Farmers More Help

A new service organization bringing farmers more field and laboratory help in fertilizer selection is being built by the I. P. Thomas division of Dixon Chemical Industries, Inc., according to Robert L. McCormick, general sales manager.

I. P. Thomas, recently acquired by Dixon from Pennsalt Chemicals Corp., markets more than 50 grades of fertilizers and special mixtures in middle Atlantic states. Important in the change of control is the fact that Dixon is a basic producer of sulfuric acid—one of the primary ingredients in the production of commercial fertilizers.

"We are setting up a new Technical Service Department to put up-to-date technical aid at farmers' disposal," Mr. McCormick stated, "As well as enlarging our field staff. Fritz Anspach has been made manager of technical sales and service. "He will be backed up by a larger number of men in the sales areas, all of whom are agronomists or entomologists," Mr. McCormick continued.

The Soil-Test Servicing Laboratory at Glassboro, N. J., approved by the N. J. Department of Agriculture, has been engaged to give Dixon customers a complete, impartial soil testing service, including fertilizer recommendations. The company is retaining and strengthening its own laboratory at Paulsboro, N. J., for special detailed soil studies and urgent work for farmers with unusual problems.

Mr. Anspach's department will also serve vocational agriculture classes in high schools, Future Farmers of America meetings and local Grange meetings. It will work closely with state and county agents and the agriculture departments of state universities to help the farmer get the best results with materials recommended by these agencies.

To develop improved communications with customers, Dixon has engaged the public relations firm of Arndt, Preston, Chapin, Lamb & Keen, Inc., Philadelphia. In addition, a program is under way to coordinate activities of Dixon's 500 dealers with those of the new service organization.

Marking out areas of the middle Atlantic states where greater technical assistance will be available to farmers and farm dealers is Robert L. McCormick, general sales manager of the I. P. Thomas division of Dixon Chemical Industries Inc., Merchantville, N.J. With him is (seated left) Fritz Anspach, manager of technical sales and service. Members of the enlarged Dixon field force are (standing, left to right) Francis Kenny, Paul Oland, William Bennett, Robert Kennel, Donald Bucks, Mike Palmer, Robert Free and (not shown) Raymond Hull and Charles Biddle III.

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POTASH

Quality fertilizer granulation begins with **Trona**'s all-new, specially-sized granular muriate of potash. The carefully regulated and controlled screen size results in reduced segregation and uniformity of finished product. Whatever your mixing method—batch or ammoniation, **Trona**'s new **granular** assures a quality fertilizer uniform in particle size.

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Producers of: **BORAX • POTASH • SODA ASH • SALT CAKE • LITHIUM • BROMINE • CHLORATES PERCHLORATES • MANGANESE DIOXIDE** *and other diversified chemicals for Industry and Agriculture*

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Technical service field representatives, to aid you with any problem, are as near as your telephone.

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The proper bucket application gives you maximum cable life

New Blaw-Knox Booklet tells you how

Bulletin 2510 illustrates and describes in pictures and text the proper relationship between:

1. Preferred or required direction of bucket opening.
2. Location and contours of the pile of material.
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Users report amazing increases in cable life as well as improved bucket performance as a result of applying these practical suggestions. A copy of Bulletin 2510 is yours without obligation. Write for a copy today.

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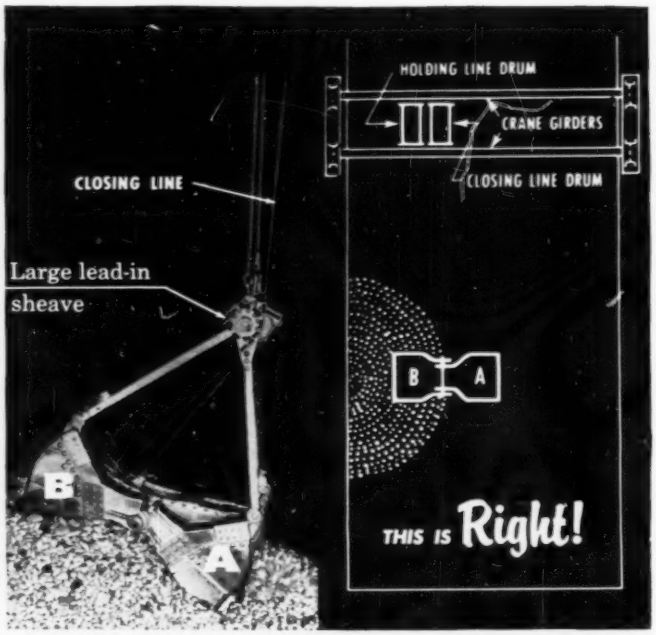

BLAW-KNOX

Association Activity

Three Ruritan Clubs in Curituck County, N. C., have launched a concentrated soil testing drive Oct. 20 in an effort to obtain soil samples from every field in the County. The project is being set up as a contest with the various county communities competing against one another for hop honors. The drive ends Dec. 1.

Don Alexander, Smith-Douglass Co., Inc., and County Agent Luke Powell are co-chairmen of the drive, and will supervise the entire county operation.

The Plant Food Institute of North Carolina and Virginia, Inc., the American Potash Institute, and the National Plant Food Institute are cooperating in the soil testing drive.

• • •

Georgia's intensified soil fertility program is being expanded during 1958-59 to 25 additional counties following the outstanding success of a pilot project in six counties during 1957-58. The National Plant Food Institute, through its Southeastern regional office, again is helping to support the program which is being conducted by the Georgia Agricultural Extension Service. Additional support and assistance was provided by the Georgia Plant Food Educational Society.

A preliminary evaluation of results indicates a significant change in farmers' fertilizer buying habits in the six pilot counties—all in line with program objectives. While sales comparisons are not yet available on a tonnage basis for all of 1958, consumption data for the January 1 through July 31 7-month period show that: (1) Farmers used less of the non-recommended grades and more of the recommended grades; (2) There was a significant increase in consumption of fertilizer grades high in potash; (3) consumption of nitrogen both in mixed fertilizer and as straight materials increased (more nitrogen was used during the first seven months of 1958 than during all of 1957); (4) Suppliers in the six counties have indicated to the Extension Service that use of lime was greatly increased, and (5) the average plant nutrient content of mixed fertilizer consumed was higher (26.3 per cent in 1958 as compared with 25.0 per cent in 1957).

• • •

The recommendations of the National Joint Committee on Fertilizer Application have been published in a brochure, Methods of Applying Fertilizer, now being distributed by the National Plant Food Institute.

The booklet includes general fertilizer recommendations for all major field and vegetable crops, fruits and nuts, and forest trees. It also discusses the application of liquid fertilizers and direct foliar application of fertilizers.

Single copies of the publciation are available free of charge from the National Plant Food Institute, 1700 K Street, N. W., Washington 6, D. C.

Fulton Stops Bag Production

Concentrating on industrial fabrics, canvas and laminated products, Fulton Bag & Cotton Mills, Atlanta, have announced that they will cease the manufacture of textile bags, as of the end of this year. Fulton was established in Atlanta in 1868 and is headed by Clarence E. Elsas.

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SPRAYS • DUSTS • FERTILIZER
TRIANGLE BRAND COPPER SULFATE
Successful growers prefer fertilizer and fungicide formulations containing Triangle Brand Copper Sulfate. They know that in fertilizers it is necessary for enrichment of the soil; in fungicidal sprays, where Bordeaux Mixture is the most reliable, or in copper dusts, Triangle Brand Copper Sulfate has definitely proved its superiority over organic materials.
Use of Triangle Brand Copper Sulfate in sprays, dusts and fertilizers results in larger and healthier crops, meaning MORE PROFIT for the grower and MORE PROFIT for the mixer or formulator who serves him.
Triangle Brand Copper Sulfate, which will increase your profits, comes in these convenient forms:
INSTANT (powder) for quick and efficient mixing of Bordeaux sprays.
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Equipment News Roundup . . . .

New 'Micronizer' Booklet

Sturtevant Mill Company announces availability of a new Micronizer bulletin, incorporating information on an additional model now available.

The booklet discusses the Micronizer's potential in fine-grinding, contains typical grinding information, reveals informaton, reveals steam and/or air requirements, includes schematic drawings of the unit. It points out how firms may take advantage of Sturtevant's fine grinding laboratory for custom or experimental grinding work.

The two-color four-page illustrated brochure (Bulletin 0915M58) may be obtained by circling Number 45 on CF's Information Service card, page 51.

Spark-proof Filter Fans

Aget Manufacturing Company has announced inclusion of non-magnetic, spark-proof fans in several models in their 'Mistkop' line. Made of hardened, cast aluminum, these fans cannot possibly give off sparks in the event of accidental contact.

The mist-fog collectors are built to a simplified design consisting of a fan, filter and condensate element. The only electrical power required is for the operation of the motor. No special connections, duct work or piping are needed. Life of condensing material is normally from 6 months to one year. Mistkop collectors have suction capacities from 600 to 3600 CFM.

For further information, circle Number 46 on CF's Information Service card, page 51.

Automatic Bulk Scale

A completely mechanical bulk weighing scale has been developed by Richardson Scale Co. to weigh and record dry, granular, sluggish, powdered and dustry materials.

Designed to handle either finished products or ingredients in process, the new scale is specially equipped with a totalizing counter for exact recording of all operations. Both scale and counter are totally enclosed. Designated model MSM, it is made in capacities from 20 to 50 lb. with volumes up to 5 cu. ft. of materials from ¼-in. lumps down to 300 mesh particles.

For more information on the Model MSM bulk weighing scale with totalizing counter, circle Number 47 on CF's Information Service card, page 51.

Pneumatic Conveyors

Availability of an eight-page technical bulletin on practical pneumatic conveyor design has been announced by Sprout, Waldron & Co. Prepared by the chief engineer of their materials handling division, the article gives background information on how to select, operate and maintain pneumatic systems for transporting dry bulk materials.

Bulletin I-28 covers positive, negative and combination systems. Illustrations, graphs and other technical data make this a must for anyone concerned with air handling. Copies free by circling Number 48 on CF's Information Service card, page 51.

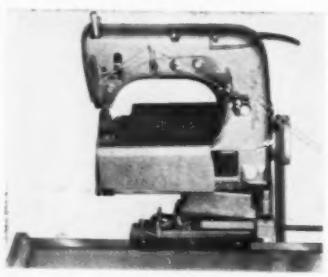
Duplex Bagging Scale

A new high speed bagging scale has been announced by Thayer Scale Corporation. Model 2N18CC is an automatic duplex filling unit consisting of two net weigher scales discharging into a common hopper.

The scale can be either manually dumped by a foot switch or automatically dumped, and can be set to make from 25 to 30 dumps per minute in capacities from 25 to 100 lbs. each. It features two double bulk and dribble feeders, two weigh hoppers, two totally enclosed Thayer Flexure Plate Scales, surrounding dust cabinet and thayer Bag Holder (optional).

An application and specification manual is available by circling Number 49 on CF's Information Service card, page 51.

New Sewing Head



Union Special Machine Company announces a new high-speed sewing head, Style 53600 H, for closing medium and heavyweight bags made from burlap and single ply or multiwall paper. This new machine offers a 25 per cent increase in speed in this field over Style 80600 E heretofore used in this range. Style 53600 H thus fills the need for a higher speed machine capable of handling bags in the medium to heavyweight range on continuous production whereas Style 80600 E is recommended for extra heavy bags that impose lower maximum production speed. For details circle Number 50 on CF's Information Service card, page 51.

Electronic Formula Control

The simplicity, compactness, and accuracy of a new "Boss Board" control system for instant formula changeover is described in new bulletin NP-1 offered by Richardson Scale Co. Formulas are changed instantly by locking into place an individual Boss Board, pre-set for the required formula. The control is used with Richardson Select-O-Weigh systems to automate of batching and mixing operations.

For a copy of bulletin NP-1 circle Number 51 on CF's Information Service card, page 51.

Dust Collector Bulletin

A new 12-page, two-color bulletin detailing the Joy Microdyne Dust Collector has been released by Joy Manufacturing Company.

The Microdyne is a wet inertial type dust collector installed as part of the duct and only one-tenth the size of other collectors of comparable performance. Collection efficiencies are 95% of all dust 5 microns in size, 80% of dusts in the 1 micron range.

Bulletin J-616 is illustrated with more than a dozen photographs of the Joy Microdyne at various installations throughout the country. It contains performance curves, complete specifications, accompanying cutoway drawings of the inner construction, as well as a description of a related filter for reclaimation or removal of the collected slurry.

For bulletin J-616 simply circle Number 52 on CF's Information Service card, page 51.

New Lift Truck Drive

A new power transmission method based on hydrostatics is announced by Towmotor Corporation, manufacturer of fork lift trucks. 'Towmastatic Drive' enables operators to control all forward and reverse movements with a treadle-type pedal operated by the left foot, a simple heel-and-toe action.

The new drive requires no clutch assembly, transmission, drive line or differential, and manual shifting levers are also eliminated. Toe pressure moves the lift truck forward, and a slight heel pressure actuates revense travel; smooth, rapid pick-up, with no jarring of loads, and "inching" of truck is accomplished by this same pedal control; even normal braking can be done by operation of the drive pedal.

Two constant displacement pumps driven by the conventional gasoline engine provide a flow of hydraulic oil under pressure to two positive displacement piston-type motors which furnish power to each of the drive wheels. The two hydraulic pumps also furnish the hydraulic power for lifting and tilting.

Complete details on Towmastatic Drive may be obtained by circling Number 53 on CF's Information Service card, page 51.

New Flowmeters

New Bulletin 18L, just prepared by Schutte and Koerting Company, describes the company's line of laboratory Rotameters for measuring fluid rate of flow. Flexible connections are provided for easy installation in plastic, glass, or metal ¼" through 2" piping. The Rotameters are applicable to both liquids and gases. For copy of this bulletin circle Number 54 on CF's Information Service card, page 51.

Technical Progress is the backbone of our industry's growth

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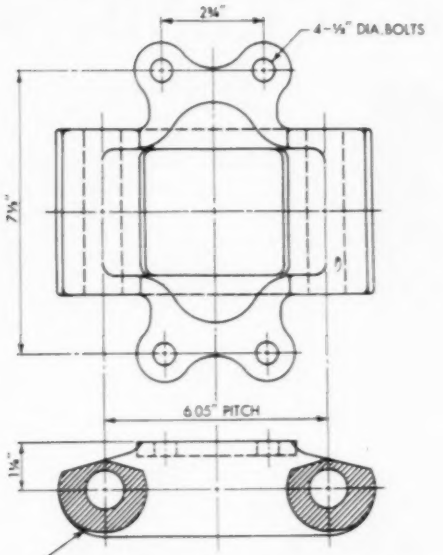
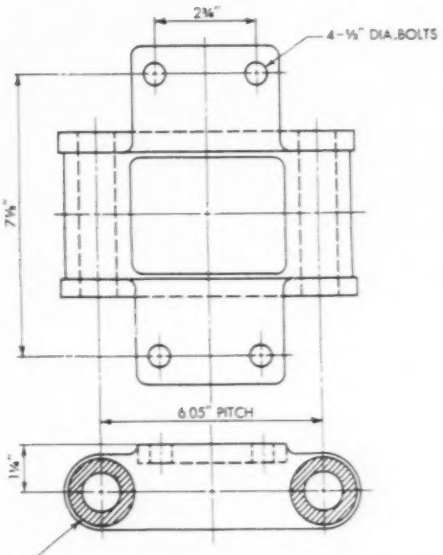
BUCKET ELEVATOR CHAIN WITH **238% MORE** WEARING TREAD AT THE **SAME PRICE PER FOOT** UNTIL DECEMBER 31, 1958

BEAUMONT "DURA-TRED"* NO. DT-132 COMBINATION CHAIN



2.06 sq. in. of metal in cross section of each wearing tread — 238% more than in No. C-132 conventional chain.
Delivered price per foot with K-2 attachment every 3rd link — $5.46.
Current delivered price of 16 tooth chilled rim, 3 15/16" bore solid wheel for No. DT-132 chain — $108.00.
Current delivered price of 16 tooth chilled rim, 3 15/16" bore split wheel for No. DT-132 chain — $131.00.
This modern chain, with a builtup wearing tread, was developed in 1950 and improved in 1958.

CONVENTIONAL NO. C-132 COMBINATION CHAIN



Only .86 sq. in. of metal in cross section of each wearing tread.
Current delivered price per foot with K-2 attachment every 3rd link — $5.46.
Current delivered price of 16 tooth chilled rim, 3 15/16" bore solid wheel for conventional No. C-132 chain — $108.20.
Current delivered price of 16 tooth chilled rim, 3 15/16" bore split wheel for conventional No. C-132 chain — $131.21.
This chain was developed in 1908.

A DEVELOPMENT OF THE CHEMICAL HANDLING DIVISION OF BEAUMONT BIRCH CO.

After 8 years of service in domestic and foreign industrial and chemical plants "Dura-Tred" design chain has proven it has 2 to 3 times the service life of the conventional chain constructed of the same material. The hole spacing in the K-2 attachment for attaching the buckets and the pitch, 6.05" are the same in the "Dura-Tred" design chain as in conventional No. C-132 chain. The only difference is in the thickness of the wearing tread and service life.

To introduce and help many more customers share in the savings made possible through the use of "Dura-Tred" design chain, U. S. Patent No. 2,625,830, Beaumont Birch Co. offers until December 31, 1958 both the chain and wheels at the same delivered price as conventional chain and wheels. After December 31, 1958 the chain price will be increased 27½% over this special sale price. The amount of chain and wheels you may order during this special sale is not limited. Therefore, you may order a spare chain and set of wheels for each of your bucket elevators using No. C-132 combination chain. Order direct from this advertisement giving length of chain, type, size and bore of head and foot wheels.

Meet and better your competition by saving on your equipment and service costs. Send us your order today. If there are any questions telephone or write.

BEAUMONT BIRCH CO.

Since 1904, Better Materials Handling Equipment

1505 RACE STREET, PHILADELPHIA 2, PA.

Phone: LOcust 4-3570

Note: After January 1, 1959 sizes DT-102B and DT-111 will be available at conventional chain prices.

CONTROL OFFICIALS HEAR CONSTRUCTIVE TALKS, ELECT INDIANA'S QUACKENBUSH

The fertilizer industry can gain vital things from the October 17 meeting of the Association of American Fertilizer Control Officials in Washington. Woody N. Miley of Arkansas showed how a continuing and thorough study of local fertilizer grade trends could help the industry. E. A. Epps, Jr., of Louisiana laid out the dangers of racketeering in the rapidly growing field of specialty fertilizers. Vincent Sauchelli's report on the progress of the NPFI Chemical Control research project should have the entire industry eager to see the published results.

As this latter is dear to the hearts of the staff of Commercial Fertilizer Magazine, permit us to report on it in some detail. The market is a ripe one. With short work-weeks and better incomes, the public is getting out into the country, growing lawns and shrubs and flowers. Every year sees this trend becoming more and more pronounced. And a mere 10% of the market, this field is growing to proportions that must be respected.

Naturally enough, racketeers have seen this opportunity, along with the established fertilizers concerns, and Mr. Epps' stories of the thing that happen would be hilariously funny, were they not so serious as a menace to the confidence the public now reposes in the leading names in the fertilizer field. For the racket boys are uninhibited, and the sky is the limit in what they do.

They offer products which are mostly tinted water. They put a modicum of plant food in a maximum of inert and cheap material. After all, nature can always take the rap if nothing comes of this type of application. And nature does cooperate in the way of trying to make things grow, regardless of man's foolishness.

The advertising done by some of these fly-by-night outfits is way up in the blue sky yonder. They talk volubly about Nature, and Nature's Own Plant Foods. They plead virtuously that no chemicals have been added, being apparently unaware of the mockery in this statement. They pull out all the stops on Organic,

Immediate past president J. D. Patterson of Oregon presents honorary plaque to retiring AAFCO President J. J. Taylor of Florida, at conclusion of the 12th annual convention of the Association of American Fertilizer Control Officials in Washington, October 17. (Commercial Fertilizer staff photo).

perhaps to play on the cult in this field, but more likely to throw aspersions on the regular lines of honestly made chemical fertilizers.

The use of "Minor Elements" as bait is tossed around gaily, and makes a showing mighty impressive to the innocent householder. Some of these compounds are hailed as soil conditioners. Some are featured as making a whole gallon of fertilizer from a tablespoon of the product. And, reminiscent of the toothpaste field, most of them contain mysterious "XYZ-49" ingredients, which no other can contain because there's no such thing.

These gyrations are amusing, but we of this magazine string along with Chief Chemist Epps in raising the red flag of warning. Our industry has too much at stake to let a few crooks take our whole credibility foundation out from under us.

Mr. Miley presented a discussion of a thorough job of keeping track of the trends in fertilizer use in his state. Keeping track of the changes from one grade to another, the rise of some, the fall of others—this is a service which, if it could be done in every state, would vastly simplify the production job for our industry, and greatly ease the selling job. It could mean fewer grades at the production level, and smaller inventories for our dealers. The paper, when it appears in Proceedings will be well worth your careful study.

As is the case with most Control Officials meetings, most of the talks and action must be reported in full to be fair and to be clear. Hence the importance of their annual Proceedings publication. But we can present here a few highlights to whet your appetites for the more detailed release to come.

Dr. Vincent Sauchelli told the assembly that only final evaluation needs to be completed before the NPFI study can be released. In this project our industry, the A.O.A.C. and the Control Officials all cooperated in sampling and laboratory testing work to establish the best

AAFCO officers and executive committee for 1958-1959, left to right: Ernest A. Epps, Jr. of Louisiana; Floyd Roberts of Arizona; Stacy Randle of New Jersey, vice-president; Bruce Cloaninger, of South Carolina, secretary-treasurer; F. W. Quackenbush, of Indiana, president; Charles Marshall, of Ottawa, Canada; J. J. Taylor, of Florida, ex-officio; R. C. Wetherell of Montana, also a committee member, was not present when this picture was taken. (Commercial Fertilizer staff photo).

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means of evaluating content of fertilizers. Good progress has been made, but much work is yet to be done.

The analytical work is completed, the findings are now being evaluated by the statisticians. When this is complete a report will be given with suggestions regarding future sampling procedures.

Discussing Current Agricultural Trends, Oris Wells of USDA made a major point, keynote to a talk of basic importance to fertilizer manufacturers: "American agriculture and our whole food handling and marketing system is in the process of adjusting to a wholly new technology which places an increased premium on quality of product, size of operation and, perhaps most important of all, management skill."

In his presidential address, J. J. Taylor made much the same point about trends, and stressed the fact that changing conditions would demand more skill and would increase the importance of the Control Official in the new scheme of things.

J. Richard Adams, USDA, presented a paper by himself and Walter Scholl, also of USDA. The essence of this was the increase of higher analysis fertilizers in use. Being a detailed, thorough report, it too should be read in its complete form.

The afternoon session was taken up with the annual reports of investigators, and committee reports. The election resulted in this slate of officers and executive committee members:

President, F. W. Quackenbush, Indiana; vice-president, Stacy B. Randle, New Jersey; secretary-treasurer, Bruce D. Cloaninger, re-elected, South Carolina. New members of the executive committee; in addition to the officers: Ernest A. Epps, Jr., Louisiana, re-elected; Floyd Roberts, Arizona. Mr. Taylor as retiring president automatically remains on the executive committee. Charles Marshall, Canada and R. C. Wetherell, Montana, remain on the board for another year.

NPFI Holds Conference On Chemical Control

One of the most interesting and constructive talks at the NPFI Conference on Chemical Control Problems in Washington last month was made by Bruce Poundstone, Kentucky State Chemist. There they have developed a way to iron out the differences of opinion that inevitably occur between the college, the fertilizer manufacturer and the control officials.

This device is a round table which meets 4 times a year for a free and easy discussion of problems. Eight men attend these quarterly sessions. The fertilizer industry elects three. The college chooses three—from the departments of agronomy, horticulture, entomology and botany. A control official and Bruce Poundstone who is the chairman, complete the list.

These eight men hold an all day round-table meeting, which is a sounding board for new ideas, for resolving questions on soil testing, the grade list and the like. And when they get through the day, problems are usually well ironed out.

The conference program was a full one, taking up the day fully from 9:30 A.M., and was presided over by NPFI's Dr. Vincent Sauchelli. Statistical methods in analytical chemistry were discussed by John Mandel of the US Bureau of Standards. Davison's E. Glocker talked on the proposed reorganization of Magruder sample work. From Canada Packers, research chemist

Dr. Sauchelli

C. H. Perrin discussed accurate moisture determination in fertilizers.

That afternoon, in addition to Bruce Poundstone's talk, USDA's W. M. Hoffman reported on a collaborative study of spectrophotometric analysis of triple superphosphate and Olin Mathieson's H. L. Marshall was the heart of a discussion on intermittent or continuous shaking in determination of insoluble P_2O_5.

Dr. Sauchelli gave a progress report on the NPFI chemical control project, concerning which see the Control Officials meeting report in this issue.

An open discussion was held on miscellaneous items, and in fact throughout the meeting open discussion from the floor was part of each paper presented.

Dr. Sauchelli summed up the meeting with enthusiasm for the progress made and the papers presented.

Phosphate Payrolls At New High in Florida

A recent compiliation by the Florida State Industrial Commission indicates that the workers in the phosphate industry of Polk and Hillsborough counties, Florida, are earning more money than ever before in history. There are some 5800 of them, ranging from common labor to technicians of high grade, and they make a total of $550,000 per week.

Cyanamid Continues TV Farm Newsreel Program

The agricultural division of American Cyanamid has been sponsoring a 15 minute weekly farm program, which was described here when first introduced. It has been appearing on TV stations in 52 major farm areas in 23 states. This has been renewed for another 13 weeks.

The program has been praised by high authorities as an important new medium of farm information.

Conservationists Oppose NAC Sales Plans

A recent issue of Conservation News, which is devoted broadly to the preservation of wild-life, has questioned the concentrated drive of the National Agricultural Chemicals Association members who are "shooting for a billion dollar pesticide sales goal." They mention specifically a film produced by NAC and distributed via "the primary TV outlets used by USDA."

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CFA ANNUAL CONVENTION PROGRAM

The California Fertilizer Association promises an interesting and unusual program for its Thirty-fifth Annual Convention, to be held at the Ambassador Hotel, Los Angeles, November 9-11. Featured speakers will be Ronald Reagan, famous screen and television star; Dr. Russell Coleman, executive vice president, NPFI and Roy Kennedy, Calspray Credit Manager.

600 persons, from all over the United States, from Canada, and from Mexico, will be in attendance, according to Howard H. Hawkins, Glendora, association president. Further information can be obtained from the offices of the Association, at 475 Huntington Drive, San Marino 9, California. The program is built around the Convention Theme, "Building For The Future," and it follows.

The Annual Banquet will wind up the program on the evening of November 11, following a cocktail hour sponsored by American Potash and Chemical Corporation. The Banquet and Dinner Dance, beginning at 7:30 P.M., will be held in world-famous Cocoanut Grove of the Ambassador Hotel with Freddie Martin and his orchestra. Broadway star Carol Channing will entertain.

The ladies will enjoy a social hour and luncheon at the beautiful Huntington-Sheraton Hotel in Pasadena, courtesy of CFA. During the Convention, they will participate in a golf tournament, two putting contests, bridge and canasta competition —all for prizes.

Men will enjoy golf and bowling tournaments on November 11. Prizes will be awarded.

This program was developed by committees under the direction of John M. Hooper and Thomas H. Lathe, both of Wilson & Geo. Meyer & Co., Los Angeles; and Mrs. Frank McGrane of Arcadia, California.

Sunday, November 9, 1958

2 P.M. to 5 P.M.—Registration, Main Lobby
Evening Open

Monday, November 10, 1958

8 A.M. to 5 P.M.—Registration, Main Lobby; Business Session, Ambassador Ballroom
9 A.M.—Opening Remarks, CFA President Howard H. Hawkins
9:15 A.M.—Annual Report, General Manager Sidney H. Bierly
9:30 A.M.—Soil Improvement Committee program, Malcolm F. Rice, Committee Agronomist
9:50 A.M.—"Our Future is in the Bag," Dr. Russell Coleman, NPFI.
10:20 A.M.—Recess
10:30 A.M.—"Credit—The Ignition System of Commerce—(or Don't Fool Your Spark Plugs)" Roy Kennedy, Calspray Credit Manager
11:10 A.M.—Annual Business Meeting of CFA
12:00 Noon—Organization Meeting of New Board of Directors
12:30 P.M.—Luncheon
2:00 P.M.—"Show Business and Business" Ronald Reagan
3:00 P.M.—Panel Discussion—Subject, "Building For The Future," Moderator: Dr. D. G. Aldrich, Jr., Chairman, Department of Soils and Plant Nutrition, University of California, Davis and Berkeley. Panel Members: Roy Kennedy, Credit Manager, California Spray-Chemical Corporation, Richmond, California—"Sound Credit Planning for the Fertilizer Industry." J. Earl Coke, Vice President, Bank of America, San Francisco, California—"Prospects for Expanded Farmer Use of Existing Credit Facilities." R. L. Luckhardt, Supervisor, Agricultural Technical Service, Collier Carbon and Chemical Corporation, Brea, California—"Fertilizer Industry Technology Trends." W. L. Dixon, Jr., Vice President and General Manager, Pacific Guano Company; and President and General Manager, Western States Chemical Corporation, Berkeley, California—"Trends in Granular Material Production and Use." Demont W. Galbraith, President, Agriform of Northern California, Inc., Woodland, California—"Development of Ammonia Marketing Trends." Ralph S. Waltz, Vice President and Manager, Agricultural Department, Wilson & Geo. Meyer & Co., San Francisco, California—"Wholesale Distribution Trends." James F. Sloan, President, J. F. Sloan Company, Salinas, California—"Retail Distribution Trends."
Monday evening open.

TVA REVEALS '59 PLANS

TVA has disclosed its operating plans for the current 1959 fiscal year at the Fertilizer-Munitions Development Center at Muscle Shoals, Ala., stating that work there will emphasize development of new and improved fertilizers as well as technological improvements to present fertilizer processes.

Improvements in its phosphate operations are being directed toward improving the operating economy, efficiency, and product quality and include provisions for economical recovery of byproduct fluorine, a strategic material with many industrial uses.

Another technological improvement sought in the phosphate operations is the development of methods of increasing the phosphorus recovery from phosphorus sludge and waste liquors. Phosphorus is used both as a munition, and in the manufacture of fertilizer, and has many important industrial uses.

In TVA's nitrate plant, processes are being developed for recovering hydrogen and nitrogen from waste gases. It is expected that material economies in the plant's operations will result.

Production and introduction of a new high-analysis phosphoric acid of a 75 to 78 percent grade, developed by TVA, will continue during the year. During the past year four fertilizer manufacturers used about 480 tons of the superphosphoric acid in exploratory processes and mixtures, mainly liquid fertilizers. Additional firms are requesting the material for the coming fertilizer year.

With the new superphosphoric acid, liquid fertilizers containing nearly 50 percent plant food will be produced for demonstration purpose.

Plans for 1959 also include changes in present facilities to produce with the new acid a high analysis superphosphate containing about 54 percent plant nutrient, compared with 45 to 48 percent for conventional concentrated superphosphate. Because of the higher analysis of the new material, shipping and distribution costs will be reduced.

TVA said its plans also provide

for initial production of a high analysis fertilizer using Florida leached zone phosphate as a raw material. Leached zone phosphate is in the form of aluminum phosphate, rather than calcium phosphate as in high grade ores, and is discarded as waste material in present mining operations in Florida. The leached zone material contains uranium which could be recovered when using the TVA-developed fertilizer process. Its recovery is not provided for at this time, however.

More Growth Ahead Says TVA

The fertilizer industry has seen a period of rapid growth in the past 25 years and use of fertilizer will continue to increase during the next decade, TVA says in a booklet "Fertilizer Trends" showing statistically some of the principal trends in the industry. The booklet, a revision of an earlier publication, was released Oct. 15.

The booklet states: "Since World War II fertilizer consumption in the United States has more than doubled—from 2.6 million tons of plant nutrients in 1945 to over 6.2 million tons in 1957 and an estimated 6.4 million tons in 1958. Some geographic areas are only now beginning extensive use of fertilizers. Trends in population growth and total fertilizer consumption over the past 25 years would suggest a national market in the early 1970's exceeding 10 million tons of plant nutrients used to grow the foods and fibers for the growing population of the country.

"Although relatively large proportions of some crops are now fertilized, in many cases they are fertilized at rates-per-acre much lower than the land-grant colleges recommend.

"Much more emphasis will probably be placed upon forest fertilization, non-farm use of fertilizers, and other such enterprises."

The booklet shows that consumption of all fertilizers increased in the nation from 5,546,000 gross tons in 1934, to 22,224,000 in 1957. It lists producers of various materials and total production figures including elemental phosphorus, superphosphate, concentrated superphosphate, ammonium nitrate.

TVA also has made available a limited publication "Fertilizer Summary Data" which shows fertilizer use by states and geographic areas.

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MEETING

NATIONAL FERTILIZER SOLUTIONS ASSOCIATION

1958 CONVENTION—November 16 to 18
Netherland Hilton Hotel

PROGRAM

Association Headquarters—Nov. 15-19 Parlor J
Ladies Headquarters—Nov. 16-18 Parlor D
Registration—Promenade, 4th Floor
Suppliers Conference Rooms—6th and 7th Floors

Sunday, Nov. 16

1:00-8:00 P.M.—Registration, Promenade 4th Floor
2:00 P.M.—Board of Directors Meeting, Parlor H
6:00-10:00 P.M.—Conference Rooms Open, 6th and 7th Floors

Monday, Nov. 17

8:00-6:00 P.M.—Registration, Promenade 4th Floor
9:30 A.M.—Opening General Session, Pavillon Caprice. Secretary George H. Serviss presiding.
President's Address—Richard Cecil; Report of Nominating Committee—E. E. Crouse, chairman; Election of Directors; How Farm People Accept—Prof. George M. Beale; New Ideas and Problems—Prof. Joseph Bohlen, Iowa State University
11:00 A.M.—Coffee Break
11:15 A.M.—General Session, Pavillon Caprice, Secretary George H. Serviss presiding; Discussion Period
2:00-6:00 P.M.—Conference Rooms Open, 6th and 7th Floors
6:00 P.M.—New Board of Directors Dinner Meeting, Parlor I
7:00-10:00 P.M.—Conference Rooms Open, 6th and 7th Floors

Tuesday, Nov. 18

9:00 A.M.-7:00 P.M.—Registration, Promenade 4th Floor
9:30 A.M.—General Session, Pavillon Caprice, Treasurer John L. Wilson presiding; Report of Executive Vice President, E. E. Crouse; A Changing Economic Society—A Challenge to Business, Dr. Samuel N. Stevens, Leadership, Stevens, Thurow & Associates, Chicago, Illinois.
10:45 A.M.—Coffee Break. Hosts:
11:00 A.M.—General Session, Pavillon Caprice; Discussion Period.
2:00 P.M.—General Session, Pavillon Caprice, Vice-President William B. Parrish, presiding; Planning for Profits, Panel Discusion, E. E. Crouse, moderator; Production and Inventory Control, Robert Weber, Monsanto Chemical Company; Production Equipment, William Arnold, Allied Chemical Corporation; Application Equipment, W. Harold Schelm, Schelm Brothers, Inc.; Standardization, Donald Weber, Spraying Systems, Inc.; Discussion Period
4:00-6:00 P.M.—Conference Rooms Open, 6th and 7th Floors
6:00 P.M.—Dutch Treat Cocktail Party, Pavillon Caprice
7:00 P.M.—Annual Dinner, Pavillon Caprice, President Richard Cecil presiding; Introduction of New Officers, Richard Cecil; Bovine Architecture, Dr. James Hays, Michigan State University
9:00-11:00 P.M.—Conference Rooms Open, 6th and 7th Floors

Prominent speakers from agricultural and business fields will address the 1958 National Convention of the National Fertilizer Solutions Association November 16-18 at the Netherland-Hilton Hotel in Cincinnati.

These addresses will be interspersed with business meetings, dinner meetings, panel discussions and social activities during the three day convention.

Theme of this year's convention is "Planning for Profits." Registration opens 1 p.m. Sunday, November 16.

A feature of the convention will be the Conference Room Program which enables manufacturers and suppliers to meet with their customers in special rooms designated for this purpose.

General Chairman of the 1958 Convention Planning Committee is William B. Parrish, Auburn, Illinois. Serving with him are E. E. Crouse, Liberty, Indiana, Ernest M. Harper, Allied Chemical Corporation, New York, N. Y., Carl Schumacher, Monsanto Chemical Company, St. Louis, Missouri and John L. Wilson, Semo Liquid Fertilizers, Inc., Charleston, Missouri.

Committees

Planning — William B. Parrish, General Chairman, Auburn, Ill.; E. E. Crouse, Libertyville, Ind.; Ernest M. Harper, Allied Chemical Corporation, New York; Carl Schumacher, Monsanto Chemical Company, St. Louis; John L. Wilson, Semo Liquid Fertilizers, Inc., Charleston, Mo.

Sergeant-At-Arms—Byron Jacobs, Chairman, Tryco Mfg. Company, Decatur, Ill.; Donald A. Fletcher, Pacific Supply Cooperative, Portland, Ore.; Don Foster, Deshler Plant Foods, Ottawa, O.; Wayne R. Johnson, Johnson Bros. Mills, Inc., Shennandoah, Iowa; William B. Spargur, Delevan Mfg. Company, West Des Moines, Iowa

Membership—W. Harold Schelm, Chairman, Schelm Bros., Inc., East Peoria, Ill.; Nelson D. Abell, Ouachita Fertilizer & Chemical Co., Monroe, La.; H. R. Berry, Gates Rubber Company, Denver, Colo.; Ralph Helmstetter, H & R Agricultural Service, Norwalk, O.; Robert Lemler, Allied Chemical Corporation, Indianapolis, Ind.; O. L. Ohnstad, Ohio Liquid Fertilizer, Inc., South Solon, O.; Hugh S. Surles, Jr., Planter Cotton Oil & Fertilizer Company, Rocky Mount, N. C.

Hostesses — Mrs. Richard Cecil, Chairman; Mrs. E. E. Crouse, Mrs. Ralph Helmstetter, Mrs. William B. Parrish, Mrs. Donald R. Webber, Mrs. John L. Wilson.

Suppliers Conference Rooms—E. E. Crouse, Chairman; George H. Serviss, G.L.F. Exchange, Ithaca; Donald R. Webber, Spraying Systems Company, Bellwood, Ill.; John White, Farmers Fertilizer Company, Cozad, Neb.

Council Announces December Conference

The theme of the 1958 Beltwide Cotton Production Conference will be "cotton in an efficient agriculture," the National Cotton Council reports.

The conference will be in Houston, December 17-18, at the Rice Hotel. Subjects to be discussed by various authorities include insect control, fertilization, weed control, cotton quality, obtaining vigorous stands, taking gossypol out of cotton, cotton production in Russia, and cotton and the weather.

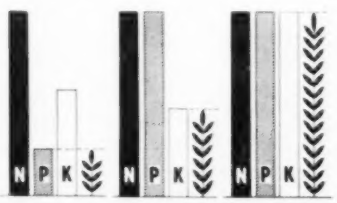
Operation "Big Test" got underway recently in Scotland County, N. C.

Objective of this community-organized and community-sponsored project is to add $1 million to the county's farm income by having soil tests made on each farm, and by getting all of the county's farmers to follow fertilizer and liming recommendations of North Carolina State College.

The Scotland County project is patterned after a similar program in Hoke County, N. C. which resulted in an 11 percent increase in fertilizer sales this year despite a 40 percent reduction in cotton acreage—the county's most important fertilizer-using crop—and a downward trend in fertilizer consumption for the State as a whole. The Southeastern Regional Office of the National Plant Food Institute is assisting with both the Hoke and Scotland County programs.

How the Hoke and Scotland County programs were organized and operated will be a principal topic for discussion at the Southeastern Fertilizer Conference being sponsored by the National Plant Food Institute, October 29-30, at the Atlanta-Biltmore Hotel in Atlanta.

Sponsoring the "Big Test" is the Scotland County Development Committee of the Laurinburg Chamber of Commerce. Co-chairmen of the drive are County Agent J. B. Caudill and W. M. Campbell, Dixie Guano Co. The program has the official sanction of the board of county commissioners which opened the soil testing drive on September 15 with a formal resolution. Numerous local merchants, bankers, and farm and community organizations are giving their full cooperation. Advice and assistance also is being provided by specialists from North Carolina State College.



The law of limiting factors is one of the most important laws affecting the farmer, American Potash Institute agronomists report. Here one effect of this law on plant growth is illustrated. Each nutrient has a specific job to do in plant life and when one element — just one — is missing or short, the plant's whole development is stunted. On the left, plant development is limited by too little phosphate (P) available. In the center, potash (K) is the limiting factor that controls yield. At right, when you satisfy the crop's need for all nutrients, you get maximum growth. Complete—balanced—fertilization is one step toward licking the many limiting factors most farmers face.

research results & reports

About 30 farm leaders in local communities were responsible for getting information to farmers and encouraging them to participate in the soil testing drive.

Nearly 50 merchants, bankers and county offices throughout the county passed out soil sample cartons, information sheets and sampling equipment, and served as collection depots for soil samples. The Agricultural Development Committee was responsible for collecting the samples and transporting them to the soil testing laboratory in Raleigh. The entire service was free to farmers.

Local newspapers and radio stations are providing publicity, and many local merchants are plugging the drive in their advertising. Large posters have been distributed widely throughout the county.

The success of the Hoke County project and others in the Southeast has been so striking this year, that several others are planned or are underway for next year in other parts of the country.

* * *

Plants, like people, can remain backward in their growth when they don't get the balanced diet their system needs, American Potash Institute agronomists report.

The scientist calls this the "law of limiting factors"—that is, each nutrient has a specific job to do in plant life and when one element is missing or short, plants are stunted. They remain small and form but little foliage. Their flowers cannot develop properly. The ears of cereals carry only a few light grains. Fruit trees bear few fruits. Tubers of potatoes and roots of sugar beets remain small.

Too often the farmer pays little attention to this gradual reduction of his yields. And when he does notice it, he blames the weather or some other uncontrollable factor. But a day comes when the hunger of his crops shows through, in the form of definite deficiency symptoms.

The leaves show necrotic spots and margins, scorch, dying tissue, etc. Development, fruitfulness, stability, formation of vitamins, volatile oils, etc., are further restricted and reduced. Animal and fungal pests attack the loose, badly developed plant tissues.

When a farmer lets things go as far as this on his fields, he has already suffered for a long time great losses by reduced yields. And once the soil is allowed to become this poor, much labor and money must be spent to put it right again.

Nutrient deficiencies, of course, aren't the only limiting factor the farmer faces. There are such factors as variety, stand, weeds, insects, disease, weather, soil aeration, drainage, water, and fertilizer placement. But an adequately fed crop is more likely to face up to these factors than a hungry crop, the Institute suggests.

* * *

Nitrogen increases forage — Contrary to an accepted theory, growth of range grass in British Columbia's southern interior is not limited entirely by precipitation—even though it is as low as eight inches a year.

At the Summerland Experimental Farm, nitrogen fertilizer added to native grassland resulted in increased forage production.

It was applied as ammonium nitrate at rates of 0, 15, 30 and 60 pounds per acre.

This year these rates of nitrogen application produced 680, 880, 1,270 and 1,720 pounds of dry matter.

In terms of protein production, the results were even more remarkable. For the same nitrogen application rates, protein production was 26, 35, 56 and 107 pounds. These figures correspond to percentage protein contents of 3.9, 4.0, 4.4 and 6.2.

'Red Face' Department

In our October report on Rhode Island research dealing with the "lifting" effect of ureaform nitrogen fertilizer mixtures on sod, a typographical error left us saying in the sixth paragraph that "eight pounds of nitrogen per 1,00 square feet produced the best results." We trust that the comma cued our readers that the figure should be "1,000" and not 100 . . . since the 100 sq. ft. figure would result in 3680 lbs. of N per acre, as Frank App of Seabrook Farming Corp. pointed out in his letter to us about it.

obituaries

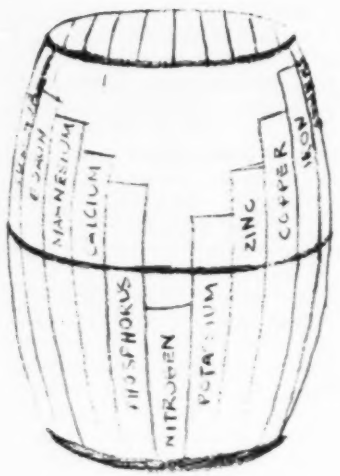
Frank A. Easton, 64, president of Sunland Industries, died October 9 in a Fresno Cal. hospital after an illness of more than a month.

Elliot K. Ludington, Sr., Chairman of the Board, died of a heart attack on October 8 at St. Clare's Hospital in New York.

by VINCENT SAUCHELLI
National Plant Food Institute

Low Stave on the Barrel

Does the concept really apply to crop yield relationship?



You are all familiar no doubt with that picture of a barrel having staves of different length and the admonition that this barrel will hold no more than the level of the lowest stave. Such a convincing picture appeals to one's common sense as unquestionably true. By analogy that truism has been applied to the explanation of plant nutrient deficiency to support Liebig's "law of the minimum"—a crop can be no higher than the level of the lowest plant nutrient. We have often been cautioned that carrying an analogy too far has its pitfalls. It is the belief of many soils men and biologists that this "low stave" analogy has been misused in efforts to explain soil nutrient deficiencies. Emil Lang in 1924, discussing the law of the minimum[1] said: "Should the progress of our knowledge actually lead to the minimum law sometimes becoming superfluous, it will be especially difficult to force it out of the attics of our agricultural schools, where in the course of time it has become a cabinet specimen in the museum of rural culture."

The force of a good picture to impress on the mind of the reader a certain concept—right or wrong—was never better exemplified than in this low barrel stave illustration.

Liebig's law of the minimum states that the nutrient present in the least relative quantity determines what the crop yield shall be. If, for example, a soil contains enough nitrogen for a crop of 50 bushels per acre, enough phosphorus for 60 bushels and enough potassium and other nutrients for 70 bushels, the crop that can be produced will be 50 bushels only, because that is the size of yield that is governed by the limiting factor, nitrogen in this case. Little is gained by having the other nutrients present in relatively larger amounts than the nitrogen, until the nitrogen level has been raised as high as the next-lowest limiting nutrient, and so on. In other words, the yield is directly proportional to the amount of deficient nutrient present in the soil.

Nutrient requirements of plants

It has long been understood that a mixed fertilizer must supply nitrogen, phosphorus, potassium, sulfur, magnesium, calcium and trace elements in forms that can be assimilated by the roots of plants. Each of these nutrients is essential to plant life. Early in this century agronomists and soil scientists began to investigate exactly how plant nutrients acted, quantitatively, to sustain and promote plant growth. Liebig had shown back in 1840 that plants feed on inorganic minerals present in the root zone and many scientists had since then enlarged the field of plant nutrition. It was not until E. A. Mitscherlich in Germany published his investigations around 1909, however, that a fruitful technique was evolved for definitely determining, quantitatively, the action of nutrients involved in plant growth.

Mitscherlich reasoned that all plants feed on the same group of nutrients, N, P, K, Mg, Ca, S, and so on, and that each is essential as any other; meaning that, if even one is missing, the plant fails to develop. Agronomists had from experience and observation concluded that the absolute quantities of these different nutrients are of importance. If there is a deficiency in soil nitrogen, for example, the crop will be short regardless of how abundant the others may be. If, now, the nitrogen content of this poor soil is somewhat increased, the yield will be increased to a certain degree; if the amount of nitrogen added is further increased, the yield will be further increased, assuming always the other nutrients are still present in abundance and of course, including moisture. However, this process cannot be carried out indefinitely. There is a limit to the growth of any plant even in the most fertile soil. Hence, beyond a certain level of nitrogen in the soil, it is found that any addition beyond this point will not bring forth any additional yield. This fact has been described as "the law of diminishing returns in agriculture" and expresses a truth confirmed by many thousands of field experiments with all kinds of plants, in all parts of the world. No one anywhere, has been able to obtain an unlimited amount of vegetable substance from a limited area of soil in one cycle of plant growth, that is, from seed to seed. Plants absolutely will not amplify their growth beyond a certain point regardless of how scientifically, the soil is fertilized, or how carefully its moisture, light and warmth requirements are satisfied.

Liebig was a great scientist to whom the whole world owes infinite gratitude for his contributions to agriculture's ability to furnish an abundance of food and fiber. He knew about the law of diminishing increments of yield. Yet, Liebig believed that if proper management of the soil could be learned there would be no limit to the amount of vegetable substance that could be grown even from a small area of ground—even "from a flower pot." In other words, he and many of his followers believed that the graph of

[1]Spillman W. J. Lang. E. (1924) The Law of Diminishing Returns. World Book Company, Chicago.

the yield of any species of plant is a straight line that would ascend indefinitely. It is now generally accepted by scientists, thanks to Mitscherlich and others of his school, that the graph of the yield is a curve that cannot be straightened out. It will ascend to a certain height and then inexorably tends to flatten out.

The minimum holds dominance?

It is not strictly true that the minimum factor, the one present in the smallest number of units, holds complete dominance over any given situation in plant culture. An addition of any factor of plant growth is capable of increasing yield to a certain degree so long as it is not present alrealy in its maximum amount, regardless of what is done or left undone about the other factors. Mitscherlich showed by many experiments that "the magnitude of the yield is conditioned by all the factors of growth. Each single factor exercises the greater limiting influence on yield the nearer it is to the minimum." This statement implies that the addition of a slightly deficient factor will increase yields because it will help the minimum factors to be used more efficiently. He found that no matter what kind of crop he studied, or what growth factor he was investigating, the normal increase of yield conformed accurately to a single type of curve that could be represented by the equation:

$$\frac{dy}{dx} = (A\text{-}y).C$$

in which A is the limit of yield attainable by a particular crop plant, X is the specific plant nutrient and y is an intermediate yield produced by a specified number of pounds of x, and C is a constant effect factor characteristic for each particular kind of plant nutrient and it determines the slope of the curve.

About nine years after Mitscherlich published his first results a mathematician at the University of Gottingen by the name of B. Baule rewrote the equation in this form:

$$\log 100\text{-}y = \log 100\text{-}0.301x$$

Baule substituted 100 for the A in the Mitscherlich equation to represent 100 percent of the maximum possible yield that can be produced by pushing the effect of any fertilizing material to the limit, and the numeral 0.301 is the Baule coefficient that reduces the specific effects of Mitscherlich's constants "C" to a common denominator. In the Baule equation x stands for the number of pounds per acre of the nutrient that will account for 50 percent of half of the yield A that might be attained by pushing the use of that nutrient to the limit.

Using the Baule equation, which is a percentage sufficiency concept, it can be shown that when two or more nutrients or other factors are deficient the final yield will be the product of their relative deficiencies. For example, a 90 percent sufficiency of potassium (K) and a 60 percent sufficiency of phosphorus (P) would permit 90 percent of a 60 percent yield or 54 percent of the maximum yield. Baule also showed that the amount needed for the 50 percent of a yield was the amount which added to a soil always corrected half of the remaining deficiency. Thus, one unit produced 50

(Continued on page 64)

—of This and That . . . . .

___J. Howard Brown, president and general manager, Lenox Fertilizer Corp., Lenox, Iowa, estimates that use of fertilizer in his area has doubled since 1956, says his company's business volume is about 75 percent above 1956. And he expects a very good year in '59.

___Jack F. Criswell, executive veep, Agricultural Ammonia Institute, is among those who believe that farmers will plant more acres and fertilize more heavily than ever before as a result of the Agricultural Act of 1958. Preparing for the Institute's annual convention in Chicago, December 3-5, he said farm leaders, particularly in the Midwest, generally are predicting an early and large volume of fertilizer business.

___At the top of the mimeographed program sent out by the Fertilizer Round Table Committee, the one we received had pencilled "Your friend Spillman says 'Y'all come'." Just wait til I see that guy Spillman!

___For his outstanding work, Georgia's "Doctor of Grass," Dr. Glenn W. Burton of the Georgia Coastal Plains Experiment Station at Tifton, has received many honors. But the honor perhaps closest to his heart is one that has nothing to do with grass research. In 1951, the Burtons were named the nation's "Methodist Family of the Year." Dr. Burton often fills the pulpits for ministers in the Valdosta district of the Methodist Church.

___Mention of Tifton reminds that last month the Abraham Baldwin Agricultural College, the Ga. Coastal Plain Experiment Station, the Ga. AES, and the Ga. Plant Food Educational Society, jointly sponsored a "Soil Fertility" short course. The theme, "Attaining 10 Year Crop Production Goals in Two Years" packed real pulling power for they had the largest attendance they had ever had. If you didn't know, you'd have thought Marilyn Monroe had turned up.

___In "The Tiller" for October, published by Wm. B. Tilghman Company, Salisbury, Md., this item appeared. "A small businessman is like a farmer. He is constantly striving to sell a product or service at a reasonable price for a reasonable profit. If his profit is too low, he will be forced to quit; and if his profit is too high, competition will lower this under the law of supply and demand. America was built on this principle. On the other hand, Communism and Socialism force out the small businessman. Collective farms have taken over in Russia. Let's keep the businessman and the farmer independent and not let the government favor any one group of businessmen or farmers."

___Progress note: As reported by Port officials Oct. 9, carload shipments from the rock crushing plant at West Lake, Lake Charles, La., had already exceeded the total number of carloads shipped in 1957.

___U. S. Steel's Nitrogen News can take a bow for this caption: "Fertilizer, a better buy than extra land."

percent, two units 75 percent, three units, 87.5 percent, four units, 93.75 percent and so on. This amount is referred to as one Baule unit.[2 3 4]

The reader is referred to the cited literature for more detailed explanations. It is believed that we have shown that Liebig's "law of the minimum" is inadequate for explaining the influences of plant nutrients on plant growth. The concept of the low stave on the barrel is an illustration that is easily understood and appeals to common sense. But its continued use by agronomists and others to explain the relationship between crop yields and fertilizer deficiencies perpetuates a misapprehension of the true facts. As Lange expressed it, the concept is "a cabinet specimen in the museum of rural culture." It was natural enough in its time, when we were still ignorant of the laws of growth; but it has now only a historical interest.

[2]Baule, B. 1918) Zu Mitscherlich's Gesetz der Physiologischen Beziehungen, Landwirtschaft, Jahrbuch 51: 363-385

[3]Willcox, O. W. ABC of Agrobiology (1937), W. W. Norton & Co., N. Y.

[4]Bray, Roger H. Soil Science 78: 9-22 (1954)

Hanna's Handbook In New Edition

Hanna's Handbook of Agricultural Chemicals, a 450 page volume describing more than a thousand commercial chemicals and other items used in the farm industry, is now on sale in a new edition, revised by Lester W. Hanna, the author.

Among new features is information on the Miller Bill, toxicity of certain chemicals and many other new matters of concern to the fertilizer and crop chemicals industry and users. The price is $5.95 per copy, and can be obtained from Mr. Hanna, Route 1, Box 210, Forest Grove, Oregon.

Dry Nitrogen Materials Eliminated By New Process

Spencer Chemical Company has announced that it is ready to make available information on a cost-cutting pre-neutralization process which makes it possible to manufacture non-phosphate grades such as 14-0-14 and inverted grades, such as 20-10-10 without the use of dry nitrogen materials.

Developed by the Virginia-Carolina Chemical Corporation, the process of using a pre-neutralizer involves reacting the free ammonia in a nitrogen solution with sulphuric acid before adding it to the mixer. It was disclosed by Virginia-Carolina at the 1957 Fertilizer Round Table where they pointed out the possibilities of using it to obtain larger quantities of nitrogen from solutions when making non-phosphate grades.

Recognizing the value of this development, Spencer says it initiated work at its Mixed Fertilizer Demonstration Plant to further explore the potential of pre-neutralization. Results of this work have enabled extension of the process for use in granulating inverted ratios. This makes possible significant savings over previous methods of granulating such formulas as 20-10-10 and 16-8-8.

Techniques developed in the demonstration plant and now operating in full scale granulation plants enable the mixer to:

1. Obtain all the nitrogen in non-phosphate grades from solutions, eliminating the need for more expensive dry nitrogen materials; 2. Make inverted ratios by using only solutions as a nitrogen source; 3. Make significant reductions in recycle load and formula cost in 1-1-1 ratios when all nitrogen is derived from solutions.

Only a small outlay for additional equipment is necessary to install the process, Spencer says. According to Joe Sharp, Spencer's Manager of Agricultural Technical Service, the process is already operating on a commercial scale and is now being installed in several granulation plants.

HONORS

Dr. Elmer V. McCollum, biochemist and Emeritus Professor of Biochemistry at Johns Hopkins University, has ben selected to receive the Charles F. Spencer Award for 1958. The award, given for meritorius contribution to the field of agricultural and food chemistry, is administered by the Kansas City Section of the American Chemical Society and sponsored by Kenneth A. Spencer, President of Spencer Chemical Company.

* * *

The California Academy of Sciences, oldest scientific institution on the Pacific Coast, founded in 1853, has elected **Wilson Meyer** of San Francisco to a five-year term on the Academy's Board of Trustees.

Mr. Meyer is president of the 108-year-old firm, Wilson & Geo. Meyer & Co.

* * *

E. Meade Wilson, manager of International Minerals & Chemical Corporation's plant food operations in Florida and southern Alabama, was awarded a 25-year merit pin at a meeting of area managers in the Company's new Administrative and Research Center in Skokie, Illinois, suburban Chicago. The presentation was made by John D. Zigler, general manager of the Plant Food Division.

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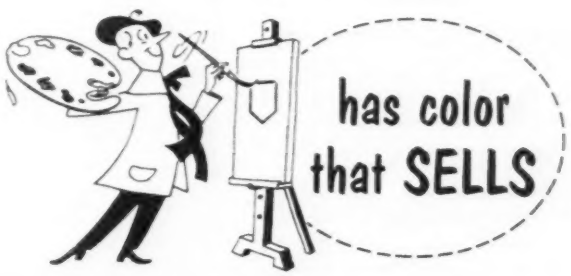

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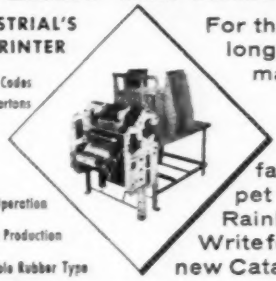
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MARKETS

ORGANICS: The tight supply situation on fertilizer organics continues, and as the mixing season becomes more active, is expected to become tighter. All producers of leather nitrogenous tankage are sold up for the entire season through June, and one major producer has just announced an increase in price of approximately $6.00 per ton for contracts already written, effective October 23.

SEWAGE SLUDGE: All major productions continue in a sold up position for the entire new season, with current prices of $3.10 per unit of ammonia and 50¢ per unit of APA f.o.b. one Midwestern production point with an advance of 25¢ per unit of ammonia scheduled January through May.

CASTOR POMACE: Fairly comfortable supplies are available at $36.00 per ton in bags, f.o.b. North Atlantic shipping point, for prompt and future shipment.

DRIED BLOOD: Unground sacked blood is indicated around $7.50 per unit of ammonia at Chicago and around $6.25 at New York.

POTASH: Potash movement is in good volume for this time of year, and prices remain unchanged from previously announced season's schedules.

GROUND COTTON BUR ASH: This type of potash primarily in the form of carbonate of potash, testing 38 to 40% K_2O, continues heavily committed for the balance of 1958 with limited supplies available for January through June shipment at prices competitive with delivered cost of domestic sulphate of potash for most destinations.

SUPERPHOSPHATE: Stocks are in adequate proportions for season's current needs, and prices are firm and steady. Movement is expanding.

AMMONIUM NITRATE LIMESTONE: On October 13th a major importer reduced his price $4.75 per ton basis f.o.b. cars at Atlantic and Gulf ports of entry. This was immediately followed by a reduction of $5.25 by a major domestic producer, so that prices retroactive to October 1st are now $45.00 per ton in bags for imported material at the ports and $44.50 per ton in bags f.o.b. Middle Atlantic production point and at the ports.

SULPHATE OF AMMONIA: Producers in general continue heavily sold for the new season at prices ranging from $32.00 per ton bulk for coke oven type to $35.00 per ton for granular synthetic material f.o.b. origin points. Port prices on the Atlantic coast range from $36.00 to $39.00 bulk f.o.b. cars.

ORGANIC AMMONIATES: Continue in tight supply with little chance of reduction in demand in the foreseeable future.

GENERAL: Fertilizer mixing activity throughout the Southeast is increasing, and particularly in the Florida area where a new season is now beginning. Prices of mineral nitrogen have been undergoing changes some on the downward side. Prices of other raw materials remain steady or are advancing upward according to previously announced schedules.

Industry Calendar

DATE	ORGANIZATION	PLACE	CITY
Nov. 5-7	Fertilizer Ind. Round Table	Mayflower Hotel	Washington, D. C.
Nov. 9-11	California Fertilizer Assn.	Ambassador Hotel	Los Angeles, Calif.
Nov. 16-18	National Fertilizer Solutions	Netherland Hilton Hotel	Cincinnati, Ohio
Dec. 3-5	Agricultural Ammonia Institute	Morrison Hotel	Chicago, Ill.

CF-Staff Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

	September		August		April-June Qtr.		January-June		July-December		YEAR (July-June)	
STATE	1958	1957	1958	1957	1958	1957	1958	1957	1957	1956	1957-58	1956-57
Alabama	-------	38,695[1]	22,611	20,826	490,441	517,785	734,062	808,901	172,721	174,713	906,783	983,614
Arkansas	-------	15,346[1]	7,919	9,120	150,970	144,336	226,889	265,235	62,752	59,915	289,641	325,150
Georgia	15,206	18,128	23,557	21,814	798,310	759,449	944,618	980,824	269,529	253,559	1,214,417	1,234,383
Kentucky	---------	21,502[1]	10,302	10,389	290,423	270,257	435,023	444,107	88,771	90,284	523,794	534,391
Louisiana	-------	10,638[1]	-- ---	9,676[1]	127,284	117,568	232,743	200,277	64,192	71,129	296,935	271,406
Missouri	-------	109,201[1]	-------	53,079[1]	333,851	240,798	420,615	460,487	335,312	331,343	755,927	791,830
N. Carolina	-------	34,293[1]	17,319	25,013	823,676	765,579	1,261,685	1,300,353	199,446	216,234	1,461,131	1,516,587
Oklahoma	-------	20,489[1]	8,448	4,992	35,804	24,968	55,964	52,836	51,436	54,509	107,400	107,345
S. Carolina	29,006	23,822	11,030	13,416	328,955	301,382	615,733	694,571	116,874	122,929	732,607	817,500
Tennessee	-------	34,696[1]	-------	16,229[1]	223,068	334,808	307,182	383,457	135,717	141,181	442,899	524,638
Texas	45,298	42,746	26,311	22,333	288,802	187,223	452,327	392,770	213,801	202,406	666,128	595,176
California	(reports compiled quarterly)				426,032	399,214	679,577	663,484	443,658	416,264	1,123,235	1,079,748
Virginia	(reports compiled quarterly)				331,222	323,034	549,773	600,158	140,783	154,075	690,556	754,233
Indiana	(reports compiled semi-annually)						795,506	781,268	284,959	305,917	1,080,465	1,087,185
New Hampshire	(reports compiled semi-annually)						16,053	15,730	3,965	3,253	20,019	18,983
Washington	(reports compiled semi-annually)						158,286	110,242	77,498	55,709	235,784	165,951
TOTAL	89,510	84,696	127,497	127,903	4,648,838	4,386,401	7,886,039	8,154,700	2,661,415	2,653,420	10,547,451	10,808,120

-------(not yet reported) * Not compiled [1] Omitted from column total to allow comparison with same period of current year.

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